APPENDIX F

BLM and Forest Service Compensatory Mitigation Plan and Amendment

Appendix F-1

BLM and Forest Service Compensatory Mitigation Plan

Jordan Cove Natural Gas Liquefaction and Pacific Connector Gas Pipeline Project Draft EIS

Appendix F

BLM and Forest Service Compensatory Mitigation Plan

Pacific Connector Gas Pipeline

Coos Bay, Roseburg, and Medford Districts and Klamath Falls Resource Area, Lakeview District, BLM Oregon; Umpqua, Rogue River, and Winema National Forests

Prepared for:

USDI Bureau of Land Management

USDA Forest Service

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1.0 INTRODUCTION AND BACKGROUND

BLM and Forest Service interdisciplinary teams have developed compensatory mitigation plans (CMP) for the PCGP Project specific to the BLM (four BLM districts) and the Forest Service (three national forests). The CMPs are based on the respective Land Management Plans (LMP), the recommendations of the 2008 and draft (2010) northern spotted owl (NSO) recovery plans, applicable Late Successional Reserve Assessments (LSRA) and 5th field Watershed Analyses (WA) for watersheds where impacts of the PCGP Project would occur. Members of the interagency team used common sense, professional judgment and knowledge of the affected landscapes to develop the mitigation actions described in this appendix. The CMPs discussed in this appendix are based on previous versions that were developed by the BLM and Forest Service and essentially the same as those described in section 2.1.4 of the DEIS.[1] These previous versions are included in this appendix as Attachments 1 and 2. They have been included because they provide a history of the development of the mitigation actions, summaries of the conditions and issues in each of the affected watersheds, and the strategy and rationale that were used in developing the actions. A central provision of the BLM and Forest Service mitigation plan is that it is to remain adaptable to new information and changed conditions.

This appendix is organized by landscapes (i.e., watersheds); central themes emerged on each landscape that drove the design of mitigation actions.

On the BLM Coos Bay District in the watersheds of the North Fork, East Fork, and Middle Fork Coquille Rivers current conditions include high road densities, sediment delivery to stream systems from roads, and high stream temperatures. Conditions also include the threat of stand replacing fire in Late-Successional Reserve (LSR) 261, fragmented habitats, and blockages of fish passage by roads and loss of pool habitat for over wintering juvenile salmonids. Desired conditions include reduced risk of stand-replacement fire in Late-Successional and Old Growth (LSOG) forest habitats, and achievement of Aquatic Conservation Strategy (ACS) objectives, (USDA FS; USDI BLM 1994b; USDA FS; USDI BLM et.al. 1998b). Mitigation actions are intended to reduce the risk of catastrophic fire by increasing available water sources, improve fish habitat through culvert removal and adding large woody debris (LWD) to streams, and reduce road-related sediment delivery to streams through road surfacing and storm proofing. Additional information on watershed conditions and the development of mitigation actions on the Coos Bay District is included in Attachment 1 of this appendix.

On the BLM Roseburg District in the watersheds of Olalla-Lookingglass, Myrtle Creek, and South Umpqua River current conditions include high road densities, sediment delivery to stream systems from roads, and high stream temperatures. Current conditions also include the threat of stand replacing fire in LSR 223, fragmentation from past logging, blockages of fish passage by roads and loss of pool habitat for over wintering juvenile salmonids. Desired conditions include reduced risk of stand-replacement fire in LSOG habitats, and achievement of ACS objectives, (USDA FS; USDI BLM 1994b; USDA FS; USDI BLM 1999). Mitigation actions are intended

[1] The Forest Service March 2011 mitigation summary was based on the previous filing by the applicant for an LNG import facility. However since the proposed pipeline location is essentially the same as previously filed, the proposed mitigation actions have not changed. The BLM March 2012 mitigation summary is based on the proposed export facility filed by the applicant in 2011 and also has not changed. The acres and miles of the PCGP Project listed in the reports for each watershed may be slightly different than listed in Chapter 2 of the DEIS since some minor variations were made to the proposed route in the 2013 filing.

to reduce the risk of catastrophic fire through fuel hazard reduction, improve fish habitat through culvert removal and adding LWD to streams, and reduce road-related sediment delivery to streams through road surfacing, storm-proofing, and drainage repair. Additional information on watershed conditions and the development of mitigation actions on the Roseburg District is included in Attachment 1 of this appendix.

On the BLM Medford District in the watersheds of Trail Creek, Shady Cove-Rogue River, Big Butte Creek and Little Butte Creek current conditions include high road densities, sediment delivery to stream systems from roads, and high stream temperatures (Little Butte Creek). Little Butte Creek is a Tier 1 Key Watershed. Current conditions also include the threat of stand replacing fire in LSOG habitat, fragmentation from past logging, and the lack of LWD in streams. Desired conditions include reduced risk of stand-replacement fire in LSOG habitats, and achievement of ACS objectives, (USDA FS; USDI BLM 1994b). Mitigation actions are intended to reduce the risk of catastrophic fire through fuel hazard reduction and improved water sources, improve fish habitat through adding LWD to streams, and reduce road-related sediment delivery to streams through road surfacing, storm proofing, and drainage repair. Additional information on watershed conditions and the development of mitigation actions on the Medford District is included in Attachment 1 of this appendix.

On the BLM Lakeview District in the Spencer Creek Watershed current conditions include sediment delivery to stream systems from roads, and high stream temperatures. Current conditions in this Tier 1 Key Watershed also include the threat of stand replacing fire in LSOG habitat and riparian reserves, and fragmentation from past logging. Desired conditions include reduced risk of stand-replacement fire in LSOG habitats, and achievement of ACS objectives, (USDA FS; USDI BLM 1994b). Mitigation actions are intended to reduce the risk of catastrophic fire through fuel hazard reduction, improve riparian habitat through riparian thinning, and reduce road-related sediment delivery to streams through road closures and drainage repair. Additional information on watershed conditions and the development of mitigation actions on the Lakeview District is included in Attachment 1 of this appendix.

On the Rogue River National Forest (NF) in the watershed of Little Butte Creek, a Tier 1 Key Watershed that also includes part of LSR 227, current conditions include high road densities, high stand densities, sediment delivery to stream systems from roads and high stream temperatures (USDA FS; USDI BLM 1997; USDA FS; USDI BLM; USDI FWS 1998a). Desired conditions include reduced stand densities, development of late-successional stand characteristics in LSR 227 and achievement of ACS objectives (USDA-FS: RRNF LRMP 1990; USDA FS; USDI BLM 1994b). Mitigations actions in the Little Butte Creek watershed are intended to reduce road densities by decommissioning roads, accelerate the development of interior stand conditions, and restore LSOG stand characteristics and aquatic systems. Additional information on watershed conditions and the development of mitigation actions on the Rogue River NF is included in Attachment 2 of this appendix.

On the Umpqua NF in the watersheds of East Fork Cow Creek, Elk Creek and Trail Creek including portions of LSR 223, current conditions include high stand densities and the threat of stand replacing fire in LSR 223, fragmented habitats, sediment delivery to stream systems from roads, blockages of fish passage by roads and the presence of non-native invasive species (UNF 1995; UNF 1995b; USDA FS; USDI BLM; USDI FWS 1999). Desired conditions include reduced risk of stand-replacement fire in LSOG habitats, reduction of fragmentation, restoration

of native species, and achievement of ACS objectives (USDA-FS: UNF LRMP 1990; USDA FS; USDI BLM 1994b; UNF 1995; UNF 1995b; USDA FS; USDI BLM; 1999). Mitigation actions are intended to reduce the risk of catastrophic fire by integrated stand density reduction and fuels management projects that build off of the Project corridor, provide fish passage at key stream crossings, restore native plant species by eliminating non-native invasive species, and reduce road-related sediment delivery to streams. Additional information on watershed conditions and the development of mitigation actions on the Umpqua NF is included in Attachment 2 of this appendix.

On the Winema NF in Spencer Creek, a Tier 1 Key Watershed, current conditions include high road densities, sediment in streams and high stream temperatures (USDA FS WNF 1995 Executive Summary). Desired conditions include reduced road densities and achievement of Aquatic Conservation Strategy (ACS) objectives (USDA-FS_WNF_LRMP 1990; USDA FS; USDI BLM 1994b). The primary objective of proposed mitigation actions is to improve aquatic conditions in the Spencer Creek watershed by decommissioning roads and restoring aquatic habitats. Riparian plantings and in-stream log placement are also planned to further reduce sediment and stream temperature. Additional information on watershed conditions and the development of mitigation actions on the Winema NF is included in Attachment 2 of this appendix.

Proposed mitigation actions are intended to be responsive to LMP objectives that include:

- Compliance with the ACS as specified in the respective LMPs
- Habitat for Threatened or Endangered (T&E) species including NSO, marbled murrelets (MAMU) and Coho salmon
- Mitigation of impacts on LSRs
- Specific resource issues as they occur by watershed

Offsite mitigation is a supplemental mitigation to address important issues or LMP objectives/management direction/standards and guidelines that cannot be acceptably mitigated on-site.

Section 2 of this appendix summarizes the different types of mitigation actions being proposed, the rationale for the actions, and the short-term adverse and long-term beneficial environmental consequences. Sections 3 and 4 describe the proposed actions for each administrative unit and fifth-field watershed. Section 5 summarizes the proposed mitigation actions in watersheds where both the BLM and Forest Service are proposing actions. Section 6 contains maps of the proposed mitigation actions by administrative unit. Section 7 contains a list of references.

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2.0 SUMMARY OF MITIGATION ACTIONS BY MITIGATION GROUP AND PROJECT TYPE

Table 2-1 summarizes all of the compensatory mitigation actions proposed by the BLM and Forest Service for the Project. The actions are summarized by Mitigation Group and Project Type. The table also provides an estimated amount of each Project Type along with the rationale for the projects and a brief discussion of potential short-term adverse impacts and long-term benefits. Each Project Type is only listed once even though some Project Types could fit into more than one Mitigation Group. For example, the Riparian Vegetation Fuels Reduction Project Type, which is in the Stand Density and Fuels Reduction and Fuel Break Mitigation Group, could also have been included in the Aquatic and Riparian Habitat Mitigation Group. The Project Types were only listed once in order to avoid confusion and double counting of mitigation actions. In placing the Project Types into a Mitigation Group, the main objective of the Project Type was the determining factor.

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
Aquatic and Riparian Habitat			The Project will remove riparian vegetation and cross streams. Aquatic restorations are aimed accomplishing objectives of the ACS and offsetting project impacts at the watershed scale. Proposed projects are located in the fifth-field watersheds affected by the Project, but because of the checkerboard nature of BLM lands, feasible projects may not be located in the same sub-watersheds as the PCGP Project.	
	Large Woody Debris (LWD) In-stream	29.76 Miles	Placement of LWD in streams adds structural complexity to aquatic systems by creating pools and riffles, trapping fine sediments and can contribute to reductions in stream temperatures over time (Tippery, Jones et al. 2010) This is responsive to ACS objectives 2, 3, 4 and 5.	**Short-term adverse effects**: In-stream LWD refers to logs (typically greater than 20 inches in diameter), limbs, or root wads that intrude into a stream channel. Placing this material in-stream can be accomplished with ground equipment such as excavators and/or helicopters. These activities have the potential to increase suspended sediment in streams and impact riparian vegetation as a result of heavy equipment use or the dragging of materials (e.g. logs) in the stream channel. Short-term impacts to water quality would occur in the form of suspended sediment and turbidity increases during implementation. However, no lasting measureable effect to water quality would occur, as any sediment plume created, would quickly dissipate as soon as in-stream activities stop. In-stream work is done during summer low flow periods when turbidity plumes are an infrequently occurring event. Project design features (PDF) would include Best Management Practices (BMP) that would prevent any indirect effects to salmonids and other stream fish from project related sediment. The placement of restoration materials in the stream by using cable systems, excavators, or helicopters would create noise that could disturb both the NSO and MAMUs. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both these species. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects**: Placing structure in streams affects channel morphology, the routing and storage of water and sediment, and provides structure and complexity to stream systems. Complex pools and side channels created by LWD provide overwintering habitat to stream salmonids and other aquatic organisms (Solazzi 2000). They also provide cover from predators during summer low flow periods when predation is at its highest. Providing more stream channel structure results in better over wintering habitat, improved summer pool habitat, and more abundant spawning gravels.

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
	Fish Passage	14 Projects	Old culverts may block fish passage either by poor design or by failure over time. Removing these blockages and replacing them with fish-friendly designs can allow fish and other aquatic organisms to access previously unavailable habitat. This is responsive to ACS Objectives 1, 2, 3 and 9 (USDA FS; USDI BLM 2012).	**Short-term adverse effects**: Removing old culverts and restoring stream/road crossings would result in short-term adverse effects similar to the effects described previously for in-stream LWD projects; both actions involve the use of heavy equipment in and around the stream channel. Similarly the work would be done during low summer flow periods to minimize impacts to aquatic species and PDFs would be designed to minimize disturbance for NSO and MAMU. **Long-term beneficial effects**: Stream crossing replacement would directly improve stream connectivity and habitat for aquatic species by immediately restoring access to formerly inaccessible habitats. Indirectly, these projects would reduce potential sediment levels in the long-term by decreasing the potential for road failure. Stream crossing projects also reduce stream velocities by increasing stream crossing sizes, eliminating flow restrictions and allowing passage to additional reaches of habitat by removing barriers to aquatic species which improves access to spawning and rearing habitat and allows unrestricted movement throughout stream reaches during seasonal changes in water levels (Hoffman 2007).
	Stream / Road Crossings	58 Sites	Restoring stream crossings reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting as a mitigation which will help offset the impact of shade removal at pipeline crossings. This work is typically accomplished in association with road decommissioning.	
	Riparian Planting	0.5 Miles	Riparian planting reestablishes willows and other riparian vegetation in areas where prior land use has removed existing vegetation. Riparian plantings reestablish shade, increase bank stability and, over time, contribute to restored riparian plan plant communities.	**Short-term adverse effects**: Riparian planting and fencing are typically done by hand and as such would not measurably impact stream sedimentation of erosion, riparian vegetation, water quality, aquatic habitats or any T&E species. Riparian fencing may require vegetation removal along the fence line but would not adversely affect water quality, channel substrate or bank conditions. **Long-term beneficial effects**: These projects directly affect riparian vegetation and would increase the health of riparian areas by promoting species diversity. Planting riparian vegetation decreases areas of bare soil and provides a sediment filtering buffer. A diverse native riparian plant community consisting of annuals, perennials, woody shrubs, and trees, provides a large variety of habitat features including food sources, shade, and large wood, and rooting depths which provide stream bank stability. Diverse, healthy vegetation has a major influence on stream channel shape and size; well-vegetated streams tend to be narrow and deep due to the binding nature of plants and their root systems (Comfort 2005). Excluding livestock access from the stream channel and riparian
	Fencing	6.4 Miles	Fencing restricts cattle grazing in sensitive riparian ecosystems. This allows riparian vegetation to be reestablished and eliminates hoof damage to stream banks.	

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
				area would improve ecological conditions within the riparian areas. Livestock tend to congregate in riparian areas due to the presence of water and green vegetation and cooler temperatures throughout the drier months. Livestock trample and graze riparian vegetation, resulting in stream bank erosion and loss of biological diversity (Belsky 1999). Excluding livestock from the riparian area would allow vegetation to reestablish and increase the likelihood of success of native shrub and tree plantings (Sarr 2002).
Road Sediment Reduction			The Project may cause sediment transport from construction clearing and use of roads by the Project. Road sediment reduction projects are aimed at reducing the chronic contributions of fine-grained sediment from road surfaces and fill failures to stream systems.	
Road Sediment Reduction	Road Decommis-sioning	98.46 Miles	Decommissioning roads can substantially reduce sediment delivery to streams (Madej 2000; Keppeler et al. 2007). Proposed road decommissioning will increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the Project occur. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (USDA FS; USDI BLM 1994b: p. B-11, C-7).	**Short-term adverse effects:** Road decommissioning methods generally include actions utilizing mechanized construction equipment to physically stabilize the road prism, restore natural drainage patterns, and allow for revegetation of the roadbed. Mechanized construction equipment might include excavators, backhoes and truck mounted loaders. Road closure is a method of preventing access to a road so that regular maintenance is no longer needed and future erosion is largely prevented by restoring drainage patterns if necessary and eliminating road traffic. Road Decommissioning has the potential to cause short-term degradation of water quality by increasing sediment delivery to streams as roads are de-compacted by heavy equipment, culverts and cross drains are removed, and other restoration activities are implemented. The use of heavy mechanized equipment near streams could disturb the stream influence zone, deliver sediment, create turbidity, and cause stream bank erosion. There is also the potential of an accidental fuel/oil spill. These projects may cause a short-term degradation of water quality due to sediment input and chemical contamination. Stream bank condition and habitat substrate may also be adversely affected in the short-term. However, with careful project design and seasonal timing, these affects are expected to be of a limited extent and duration. Road decommissioning would create noise from heavy equipment that could disturb both the NSO and MAMU. The potential for disturbance is mainly
	Road Closure	17.95 Miles	Road closure reduces fine-grained sediments by eliminating traffic impacts.	

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
				associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both these species. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Proposed road decommissioning would increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the Project would occur. Decommissioning roads would restore natural drainage patterns and thereby avoid large volumes of added sediment to the stream network that would be likely to eventually occur. In addition, road maintenance dollars would be focused on the remaining road systems resulting in more maintenance of culverts and ditchlines resulting in less potential for catastrophic failure. Madej (2001) concluded that by eliminating the risk of stream diversions and culvert failures, road removal treatments significantly reduce long-term sediment production from retired logging roads. Beneficial effects to fisheries include long-term improvements to fish habitat and riparian areas, restored fish passage for all life histories of threatened and proposed species, re-established connectivity of fish populations above and below man-made barriers, restoration of hydrologic function, and more natural routing of wood and sediment through stream systems. Road decommissioning would also benefit many species of wildlife including NSOs and MAMUs through reduced disturbance from the elimination of road traffic and long-term benefits as decommissioned roads become reforested reducing fragmentation of habitat.
	Road Surfacing and Drainage Improvement	80.55 Miles	Road surfacing reduces sediment by capping existing fine textured sediments in the running surface of a gravel road with coarser rock or by paving. Paving all but eliminates traffic-generated sediments. Drainage repair reestablishes out-sloping, cross-drains and in some cases ditchlines to ditch-relief culverts. These actions have the effect of getting water off the road before it can enter stream courses. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (USDA FS; USDI BLM 1994b: p. B-11, C-7).	**Short-term adverse effects:** Road improvements including surfacing, drainage repair, storm proofing, stabilization, and culvert replacement may result in short-term, construction-related increases in sediment. Sediment affects are expected to be of limited extent and duration and can be minimized or eliminated through the application of PDFs and BMPs. Road improvements would create noise from heavy equipment that could disturb both NSOs and MAMUs. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both these species. These PDFs
	Storm-proofing	13.78 Miles	Storm-proofing reduces sediment from roads by increasing the resistance of a road to failure during high intensity rainfall events.	

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Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
			Storm-proofing strategies include improving drainage, reducing diversion potential at culverts, outsloping road surfaces and replacing culverts with hardened low water fords.	would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Road improvement projects reduce erosion from existing road surfaces, cut banks and fill slopes, and reduce the probability of failure through improvement of road surface stability and drainage. In the long-term, road improvements reduce both chronic and episodic erosion and sedimentation. Drainage improvements, such as out-sloping, reduce or eliminate chronic sources of road erosion and fine sediment delivery resulting in long-term improvements in water quality and aquatic habitat.
	Stabilization and Culvert Replacement	5 sites	Road stabilization and culvert replacement reduce road-related sediment by stabilizing or removing failing cut and fill slopes. Culvert replacement reduces sediment by replacing undersized or failing culverts with culverts that are appropriate to pass debris at higher flows. This reduces the probability of fill failure associated with plugged culverts.	
Fire Suppression	Suppression Capacity	26 Sites	The Project will create fire suppression complexity by creation of a continuous corridor of early seral plant communities. High intensity stand-replacement fire has been identified as the single largest factor causing the loss of late successional and old growth forests in the first 15 years of implementation of the NWFP (USDA FS; USDI BLM 2011). These projects include Heli-ponds (3) and pumper access / dry hydrant pumper connections at water sources. High intensity fire has been identified as the single factor most impacting LSOG forest habitats on federal lands in the area of the NWFP. Fire control is necessary to protect LSRs and habitat for T&E species should a wildfire occur. Construction of the Project would remove both mature and developing stands and would increase fire suppression complexity however; the corridor also provides a fuel break. Quick response time is imperative for successful control in wildfire situations during initial attack. Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts.	**Short-term adverse effects**: Fire suppression capacity projects include the use of heavy equipment especially for the construction of heli-ponds which may be as large as 500,000 gallons. Soil erosion risk would increase with the proposed activities because bare soil would be exposed during implementation. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. By employing appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. Fire suppression capacity projects would create noise from heavy equipment that could disturb both the NSOs and MAMUs. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both of these species. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects**: Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts. These projects would help to reduce the threat of losing late-successional habitat to stand-replacement fire.
Stand Density and Fuels Reduction and Fuel			The Project will create fire suppression complexity by creation of a continuous corridor of early seral plant communities. The Project will also remove late successional stands in the corridor construction areas and indirectly affect LSOG habitat in stands adjacent to the project. Both mature stands and developing	

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
Break			stands would be removed during Project construction. Density management integrated with fuels reduction will increase longevity of existing mature stands by reducing losses from disease, insects, and fire. Density management in younger stands will accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Impacts to mature and developing stands will exceed the life of this project by many decades. LSRAs have identified the importance of density management to control losses to stand replacing fire. The proposed ridge line pipeline route intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation action would assist in protection and restoration of the LSRs and associated LSOG habitat values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners, and public.	
	Integrated Stand Density and Fuels Reduction	6563 Acres	WAs and LSRAs for landscapes in in Southwest Oregon have noted shifts from forests dominated by fire-resistant LSOG stands to fire-prone early and mid-seral forests (USDA FS; USDI BLM et al. 1998; USDA FS USDI BLM 1999). Use of fuels reduction and stand density management are appropriate tools to reduce the risk of high intensity stand replacement fires in these forests (Forest Service and BLM 1994b). Management activities that reduce the risk of natural disturbance adjacent to KOACs are also appropriate (USDA FS; USDI BLM 1994b: p. C-11). Stand density reductions in riparian zones have the dual benefit of reducing the risk of stand-replacing fire, while also accelerating the development of late successional stand conditions by accelerating growth of remaining trees. This project would create a fuel break on federal lands that stretches from Milo to Shady Cove Oregon.	**Short-term adverse effects**: Integrated stand density and fuels reduction activities include the use of heavy equipment for cutting, skidding, slash piling, under-burning and hauling forest vegetation. Soil erosion risk would increase with the proposed activities because bare soil would be exposed during implementation. As the amount of bare/compacted soil increases, so does the risk of soil movement. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. By maintaining proper amounts of protective groundcover along with appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. Stand density fuels reduction treatments would not be expected to adversely affect NSO nesting habitat since the treatments would not remove constituent elements of their nesting habitat. The proposed harvest treatments could temporarily impact acres of dispersal habitat. This habitat would be impacted by reduction of canopy cover as well as the loss of some LWD, shrubs and snags, which provide habitat for prey species. Although the dispersal habitat within these treatment areas would be reduced in quality, the projects would be designed so that the areas would still function as dispersal habitat. Integrated stand density treatments would create noise from heavy equipment that could disturb the NSO. The potential for disturbance is mainly associated with breeding
	Under-burning	2035 Acres	Under-burning is a component of the integrated stand density reduction. This provides a mechanism to maintain shaded fuel breaks created by mechanically thinning stands. It also reintroduces fire on selected landscapes as recommended in various WAs and LSRAs.	
	Pre-commercial Thinning	1039 Acres	Pre-commercial thinning reduces stand density in overstocked young stands. This reduces the risk of stand replacing fire, increases the resilience of remaining trees to low intensity fire and accelerates the development of late successional stand	

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Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
			characteristics.	behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. Under-burning and burning of slash piles can impact air and visual quality during burning activities. All burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan and to minimize any adverse effects on air quality. Burning prescriptions would be developed to minimize the potential for adverse effects. Implementation of these measures would ensure compliance with the federal Clean Air Act. **Long-term beneficial effects**: By creating less dense stands with less tree competition, residual trees would benefit from the increased availability of sunlight, nutrients and water. With the increase of available nutrients, trees should be more vigorous and less susceptible to large scale insect/disease out-breaks. The proposed treatments would move the vegetation towards conditions that would have occurred under a natural disturbance regime. This would lower flame lengths, reduce fire spread and lower the probability of tree mortality in the event of a wildfire, leading to more successful suppression efforts. Aerial delivered retardant or water would be more effective in lighter fuels and a more open canopy, making it safer for firefighters to successfully anchor and contain wildfires. These actions would reduce the threat of losing LSOG habitat to fire.
	Riparian Vegetation Fuels Reduction	70 Acres/ 6 Miles	Fuels reduction in riparian areas reduces the risk of stand replacement fire and accelerates the development of late successional stand characteristics.	
Terrestrial / Upland Habitat Improvement			The Project will remove snags and LSOG habitat, and will create a vector for noxious weeds. Terrestrial mitigations are intended to offset the loss of snags, future recruitment of LWD and eradicate noxious weed populations.	
	Habitat Planting	620 Acres	The Dead Indian Plateau region is one of three known sites for Mardon Skipper butterflies in the world. It is also adjacent to a known site for Short-horned Grasshoppers. Both species are on the Regional Forester's Sensitive Species list. The pipeline requirement of a permanent open corridor provides a unique opportunity to develop habitat for these two species. Planting the corridor with plants preferred by these species has the potential to increase the habitat and local range for both species. Rehabilitation of disturbed sites is required under various BMP guidelines. Results would be immediate in stabilizing the local habitat and location would be in the pipeline.	**Short-term adverse effects**: This activity would take place within the Project corridor and would not result in any additional adverse impacts. **Long-term beneficial effects**: Beneficial impacts include helping to re-vegetate and stabilize the Project corridor and improving habitat for several listed or sensitive insect species.

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
			The Project may also impact habitat of *Fritillaria gentneri* which is listed as Endangered under the federal ESA. Out-planting to suitable habitat locations is recommended in the recovery plan for *Fritillaria gentneri*.	
	LWD Upland Placement	470 Acres	These projects are intended to mitigate for the loss of recruitment of LWD to adjacent stands and within Project corridor. The Project will forgo the development of LWD for the life of the Project and for decades after. LWD is a constituent element of habitat for NSO and is a significant component of late successional forest ecosystems. Replacement of LWD will partially mitigate for the barrier effect of the Project corridor by creating structure across the corridor for use by a diverse assemblage of wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID snag model) (Marcot et. al. 2002). This type of mitigation project is consistent with NWFP Standards and Guidelines page C-11 (USDA FS; USDI BLM 1994b). Acres that can be treated are necessarily limited by LWD available from the corridor.	**Short-term adverse effects**: Placement of LWD within and adjacent to the Project corridor would typically be done with heavy equipment that would drag the material into place. Heavy equipment use would increase the amount of detrimental soil damage within the treatment areas. By maintaining proper amounts of protective groundcover along with appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. LWD placement would create noise from heavy equipment that could disturb the NSO. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects**: Beneficial effects include improving habitat for late-successional species and providing for long-term soil productivity.
	Snag Creation	1,029 Acres	The creation of snags is intended to mitigate the loss of snag habitats within, and adjacent to the Project corridor. The Project would prevent development of large snags during the life of the Project and for decades after. Corridor construction will result in loss of snag habitat on approximately 775 acres of BLM and NFS lands. WAs and LSRAs indicate many areas traversed by the Project are far below historic levels of snag habitat due of past management actions. The Project would add to those cumulative impacts. As snags are a critical component of LSRs, replacement is needed. Snag requirements are specifically outlined in the BLM and Forest Service LMPs. Replacement would be immediate, though there would be a 10-year delay as snag decay occurs. Snag management is discussed in the NWFP for LSRs on pages C-14 and 15 (USDA FS; USDI BLM 1994b). Snag management levels incorporated into these mitigation projects are based on BLM and Forest Service guidelines. The function and benefits of snags are also discussed in the South Cascades LSRA - chapter 3 (USDA FS;	**Short-term adverse effects:** Snag creation typically employs the use of chainsaws or inoculum to kill live trees. As such there is little if any ground disturbance and only minimal noise disturbance. The potential for noise disturbance is mainly associated with breeding behavior at active NSO nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. Any adverse environmental impacts would be de minimus and very short-term. **Long-term beneficial effects**: Beneficial impacts include the improvement of habitat for snag dependent species and in particular those species dependent on late successional forests. Long-term benefits would also accrue as the created snags decay over time and eventually provide for LWD on the forest floor improving habitat for many other species and contributing to long-term soil productivity.

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
			USDI BLM 1998a).	
	Noxious Weed Treatments	6 Road Miles, 127 Acres	The construction and operation of the Project has the potential to create vectors for noxious weeds. These treatments are intended to reduce populations of noxious weeds that are in close proximity to the Project corridor, as well as restore meadow habitats in the fifth-field watersheds that are currently impacted by noxious weeds.	**Short-term adverse effects:** Treatments typically involve the cutting, pulling or spraying of noxious weeds. Since the work is typically done by hand there is minimal if any ground or noise disturbance. All activities would be conducted consistent with the most recent direction and plans for weed management and integrated vegetation management on BLM and Forest Service lands to minimize adverse impacts to plant and animal communities as well as water quality and aquatic habitats. **Long-term beneficial effects**: Long-term benefits would include restoration of native plant populations and species diversity. Restoring native plant communities and increasing vegetation diversity generally contributes to restoring habitat for a broad group of animal species.
Visual Impacts on the Clover Creek Road		113 Acres	The Project will create a hard visual line along the timbered edge of the corridor that does not fit with the visual objectives for the Clover Creek Road or the Dead Indian Memorial Highway. Thinning and fuels treatments can be used to soften the edge to a more natural appearing texture by restoring stand density to more natural levels and creating small openings that are consistent with the landscape. Thinning of commercial sized material may be accomplished with a commercial timber sale. The mitigation is intended to supplement funding for the non-commercial part of that work for visual purposes that could not otherwise be accomplished.	**Short-term adverse effects**: The activities associated with thinning and fuels treatments and resulting short-term adverse impacts would be similar to the impacts of the integrated stand density treatments described previously. **Long-term beneficial effects**: The proposed activity would help mitigate the adverse visual impacts of the Project along these road segments and would also create a fuel break and defensible space that could be used in helping to suppress high intensity wildfires.
Reallocation of Matrix Lands to Late Successional Reserves		1896 Acres	This mitigation group contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the Project. It also compensates for the removal of occupied MAMU habitat and suitable roosting, nesting and foraging NSO habitat. In addition, the selected parcel reduces the potential edge effects caused by management of matrix lands adjacent to occupied MAMU sites by reallocating the entire parcel to LSR. Reallocation of matrix lands to LSR also contributes to ACS objectives and may benefit S&M species by providing additional habitat that is managed to create LSOG stand conditions over time. Since the land reallocated to LSR on BLM-managed O&C and/or the CBWR lands matrix timber base, there is a need to	**Short-term adverse effects**: The reallocation of matrix lands to LSR is an administrative action that would not have any immediate environmental consequences on the ground. **Long-term beneficial effects**: The proposed reallocation would change the management direction of approximately 1,896 acres from one of multiple uses with an emphasis on timber management to a management emphasis focusing on the creation and maintenance of late-successional forest habitat. Over time, this reallocation would benefit species dependent on late-successional forests through management actions that would be designed to improve or maintain LSOG habitat conditions.

TABLE 2.1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental consequences a/
			replace those lands with other timber-producing lands to ensure that BLM continues to comply with statutes, regulations and policies for these lands. It is expected these lands would be acquired by the applicant and conveyed to the BLM to be managed as part of the matrix.	

a/ For all project types additional field surveys for T&E species, Special Status species, and Heritage Resources would be completed where necessary before implementation. In addition, consultations with the USFWS and NOAA Fisheries would also be completed as necessary prior to implementation. All future decision making under NEPA for these projects would be completed consistent with the CEQ Regulations (40 CFR 1500-1508) and would tier to this EIS.

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3.0 DESCRIPTION OF PROPOSED BLM MITIGATION ACTIONS BY FIFTH-FIELD WATERSHED

The following tables and figures describe the proposed mitigation actions by BLM administrative unit and fifth-field watershed. The Project impacts include the corridor, temporary extra work areas (TEWA), uncleared storage areas (UCSA) and associated roads and other ancillary areas subject to BLM authorization. Quantities are approximate estimates. Maps of the proposed mitigation actions are included in section 6 of this appendix.

TABLE 3-1a

Mitigation Actions Proposed in the North Fork Coquille Watershed on the BLM Coos Bay District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Coos Bay BLM	North Fork Coquille River	Aquatic and Riparian Habitat	LWD In-stream	Steinnon Creek and North Fork Coquille River Watershed In-stream LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project corridor. Implementation of the PCGP Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	3.7	miles
Coos Bay BLM	North Fork Coquille River	Road Sediment Reduction	Road Surfacing	Bridge Approach paving - Woodward & Alder Creek Roads	Road-related sediment has negatively this watershed. While BMPs would be implemented, construction of the Project would likely cause sediment to enter stream channels and may affect aquatic habitat. Surfacing the bridge approach would reduce, if not eliminate sediment input to Coho salmon and, steelhead and cutthroat trout habitat from these locations.	2	ea.

TABLE 3-1b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Coos Bay District-North Fork Coquille Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	2.9	42.5	0.0	16.6	6
LWD In-stream	3.7	33.6	19.1	33.6	
Road Resurfacing/Repair	0.1	0.2	0.0	0.2	2

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Note: LWD In-stream acres based on a 75' wide treatment area

Figure 3-1a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the North Fork Coquille River Watershed

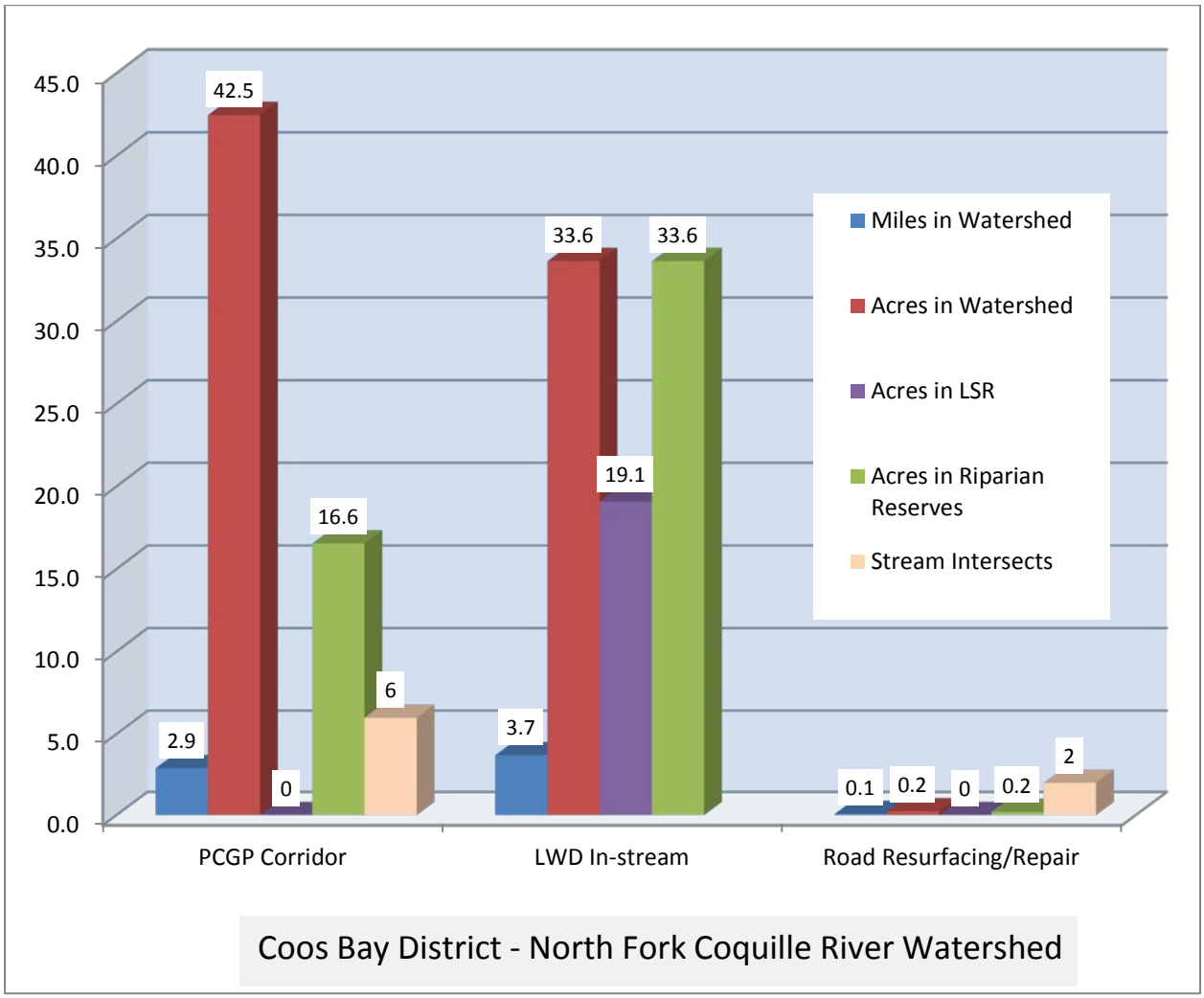


Figure 3-1b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the North Fork Coquille River Watershed

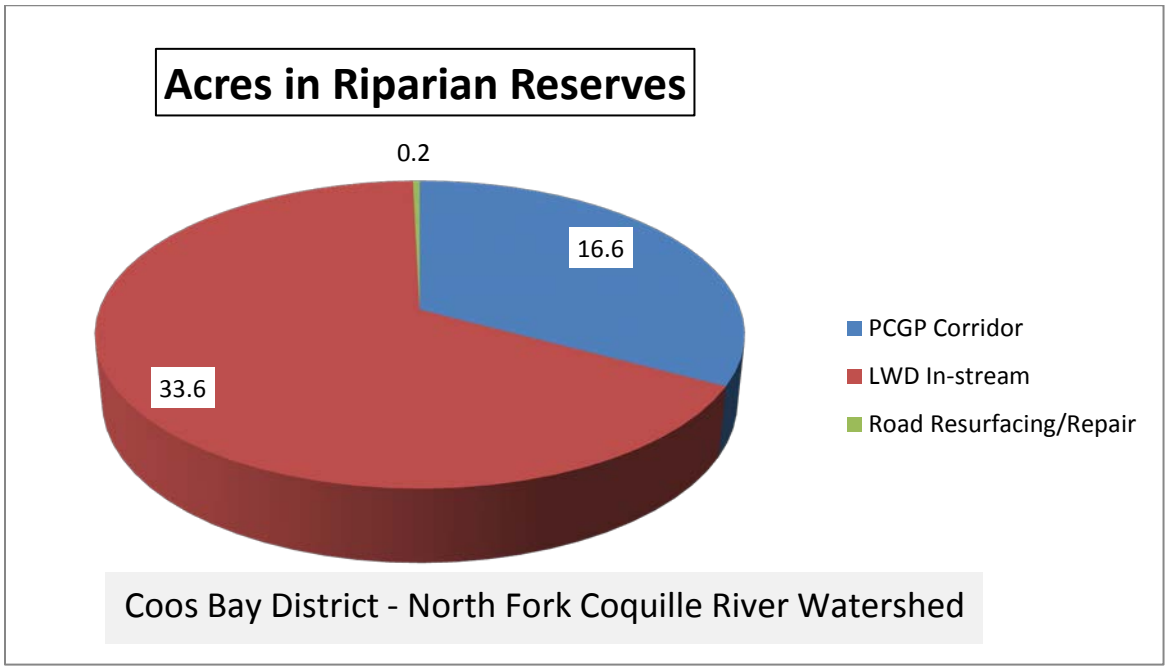


TABLE 3-2a

Mitigation Actions Proposed in the East Fork Coquille River Watershed on the BLM Coos Bay District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Coos Bay BLM	East Fork Coquille River	Reallocation of Matrix Lands to LSR	Land Re-Allocation from Matrix to LSR	LSR Reallocation and Land Acquisition	This action contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the Project. The action also compensates for the removal of occupied MAMU habitat and suitable NSO owl habitat. In addition, the selected parcel reduces the potential edge effects caused by management of matrix lands adjacent to occupied MAMU sites by reallocating the entire parcel to LSR.	180	acres
Coos Bay BLM	East Fork Coquille River	Aquatic and Riparian Habitat	LWD In-stream	Yankee Run In-stream Large Wood Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project corridor. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.7	miles
Coos Bay BLM	East Fork Coquille River	Fire suppression	Suppression Capacity	Heli-Pond Construction	High intensity fire has been identified as the single factor most impacting LSOG forest habitats on federal lands in the area of the NWFP. Project construction would require removal of both mature and developing stands and would increase fire suppression options however the corridor also provides a fuel break. Within this watershed, there is an 18+ mile gap between helicopter accessible waterholes. Quick response time is imperative for successful control in wildfire situations during initial attack. Most water sources in these watersheds are low in the	2	ea.

TABLE 3-2a

Mitigation Actions Proposed in the East Fork Coquille River Watershed on the BLM Coos Bay District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					drainage and accessible only by truck. Heli-ponds at these locations would enable a 2-3 mile radius for aerial application. Fire control is necessary to protect LSRs and T&E species habitat should a wildfire occur.		
Coos Bay BLM	East Fork Coquille River	Road Sediment Reduction	Road Surfacing	Road Surfacing - Yankee Run Spurs, Yankee Run Mainline, and South Fork Elk Creek	Road-related sediment has negatively impacted this watershed. The effects of the Project would be similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed. Surfacing the BLM roads which are parallel to Yankee Run Creek and South Fork Elk Creek would reduce if not eliminate road - related sediment input to habitat for Coho salmon and, steelhead and cutthroat trout from these locations.	5.5	miles

TABLE 3-2b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Coos Bay District- East Fork Coquille Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	2.8	43.7	21.7	4.5	2
LWD In-stream	2.7	25.0	2.8	25.0	
Road Resurfacing/Repair	5.5	13.3	0.8	8.1	29

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LWD In-stream acres based on a 75' wide treatment area.
Road Resurfacing/Repair acres based on a 20' wide treatment area.

Figure 3-2a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the East Fork Coquille River Watershed

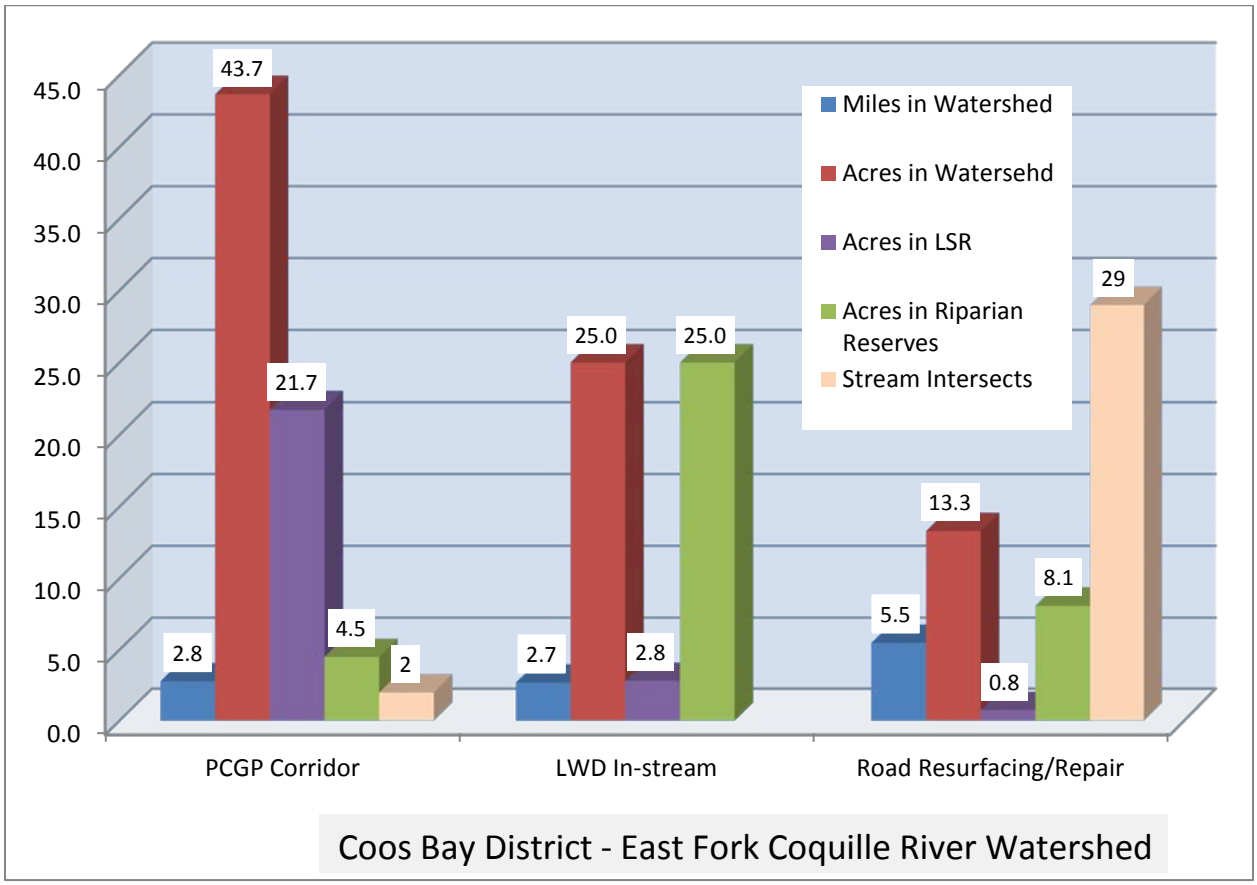


Figure 3-2b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the East Fork Coquille River Watershed

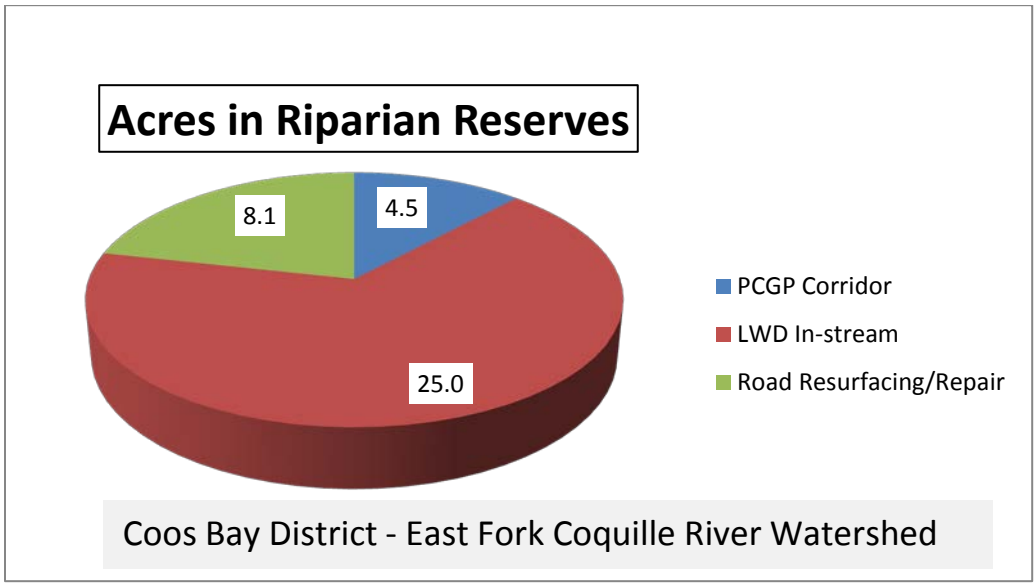


Figure 3-2c. Comparison of PCGP Impacts and Offsite Mitigation Actions in LSR in the East Fork Coquille River Watershed

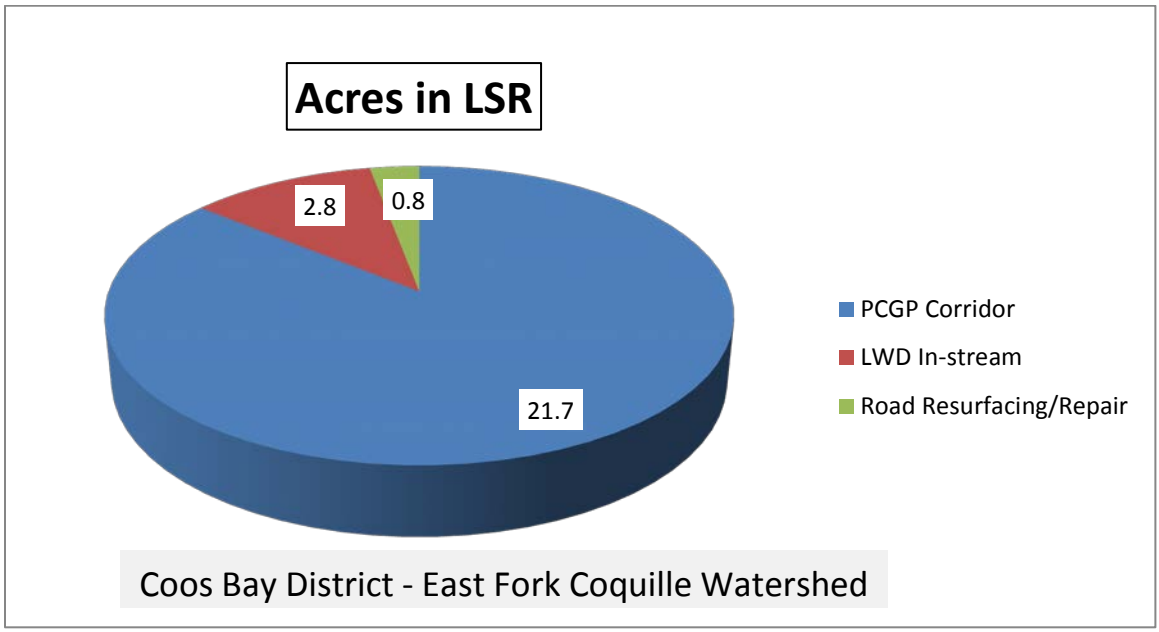


TABLE 3-3a

Mitigation Actions Proposed in the Middle Fork Coquille River Watershed on the BLM Coos Bay and Roseburg Districts

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Coos Bay BLM	Middle Fork Coquille River	Reallocation of Matrix Lands to LSR	Land Re-Allocation from Matrix to LSR	Coos Bay BLM	This action contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the Project. The action also compensates for the removal of occupied MAMU habitat and suitable NSO habitat. In addition, the selected parcel reduces the potential edge effects caused by management of matrix lands adjacent to occupied MAMU sites by reallocating the entire parcel to LSR.	207	acres
Coos Bay BLM	Middle Fork Coquille River	Aquatic and Riparian Habitat	LWD In-stream	Upper Rock Creek In-stream LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project. There are approximately 7.3 miles of Project corridor and 9 stream crossings in this watershed. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.1	miles
Coos Bay BLM	Middle Fork Coquille River	Fire suppression	Suppression Capacity	Heli-Pond Construction	High intensity fire has been identified as the single factor most impacting LSOG forest habitats on federal lands in the area of the NWFP. Construction of the Project and associated activities removes both mature and developing stands and would increase fire suppression complexity, however the corridor also provides a fuel break. Within this watershed, there is an 18+ mile gap between helicopter accessible waterholes. Quick response time is imperative for successful control in wildfire	1	ea.

TABLE 3-3a

Mitigation Actions Proposed in the Middle Fork Coquille River Watershed on the BLM Coos Bay and Roseburg Districts

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					situations during initial attack. Most water sources in this watershed are low in the drainage and accessible only by truck. Heli-ponds at these locations would enable a 2-3 mile radius for aerial application. Fire control is necessary to protect LSRs and T&E species habitat should a wildfire occur.		
Coos Bay BLM	Middle Fork Coquille River	Road Sediment Reduction	Road Surfacing	Road Surfacing - Fall Creek System and Bridge Approach paving - Sandy & Jones Creek Roads	Road-related sediment has negatively impacted this watershed. There are approximately 7.3 miles of Project corridor and 9 stream crossings in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Surfacing the BLM road which is parallel to Fall Creek and paving the bridge approach on the Sandy and Jones Creek Roads would reduce if not eliminate sediment input to Coho salmon, and steelhead and cutthroat trout habitat from these locations.	0.9	miles
Roseburg BLM	Middle Fork Coquille River	Aquatic and Riparian Habitat	Fish Passage	Loveseat Creek Culvert Removal	Man-made barriers to fish passage have negatively affected access to habitat in this watershed. The culvert at this location is a fish barrier to resident fish. Removing the culvert and associated road fill would extend the availability of upstream habitat, mitigating for reductions in habitat quality on stream reaches crossed by the Project corridor. Sediment introductions to the stream network would also cease.	1	project
Roseburg BLM	Middle Fork Coquille River	Aquatic and Riparian Habitat	LWD In-stream	Middle Fork Coquille and Twelvemile Creek In-stream LWD Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project corridor. There are approximately 7.3 miles of Project corridor and 9 stream crossings in this watershed. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key	2.6	miles

TABLE 3-3a

Mitigation Actions Proposed in the Middle Fork Coquille River Watershed on the BLM Coos Bay and Roseburg Districts

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat.		
Roseburg BLM	Middle Fork Coquille River	Road Sediment Reduction	Road Drainage and Surface Enhancement	Camas Mountain Road Drainage and Surface Enhancement	Road-related sediment and stream network extension from ditch-lines have negatively impacted this watershed. There are approximately 7.3 miles of Project corridor and 9 stream crossings in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Roads in this watershed are a source of chronic sediment delivery to fish bearing streams. Two BLM roads (9.1 and 9.2) currently show signs of water rutting and stream network extension. Storm-proofing and blocking the road would reduce the potential for sediment-laden water to be carried off the road surface and into the ditch where it could be transmitted to the stream network.	3.5	miles

TABLE 3-3b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Coos Bay District Middle Fork Coquille Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	6.8	123.7	46.9	15.8	9
LWD In-stream	4.7	42.7	4.4	42.7	
Road Resurfacing/Repair	4.4	10.7	1.5	2.8	10

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LWD In-stream acres based on a 75' wide treatment area.
Road Resurfacing/Repair acres based on a 20' wide treatment area.

Figure 3-3a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Middle Fork Coquille River Watershed

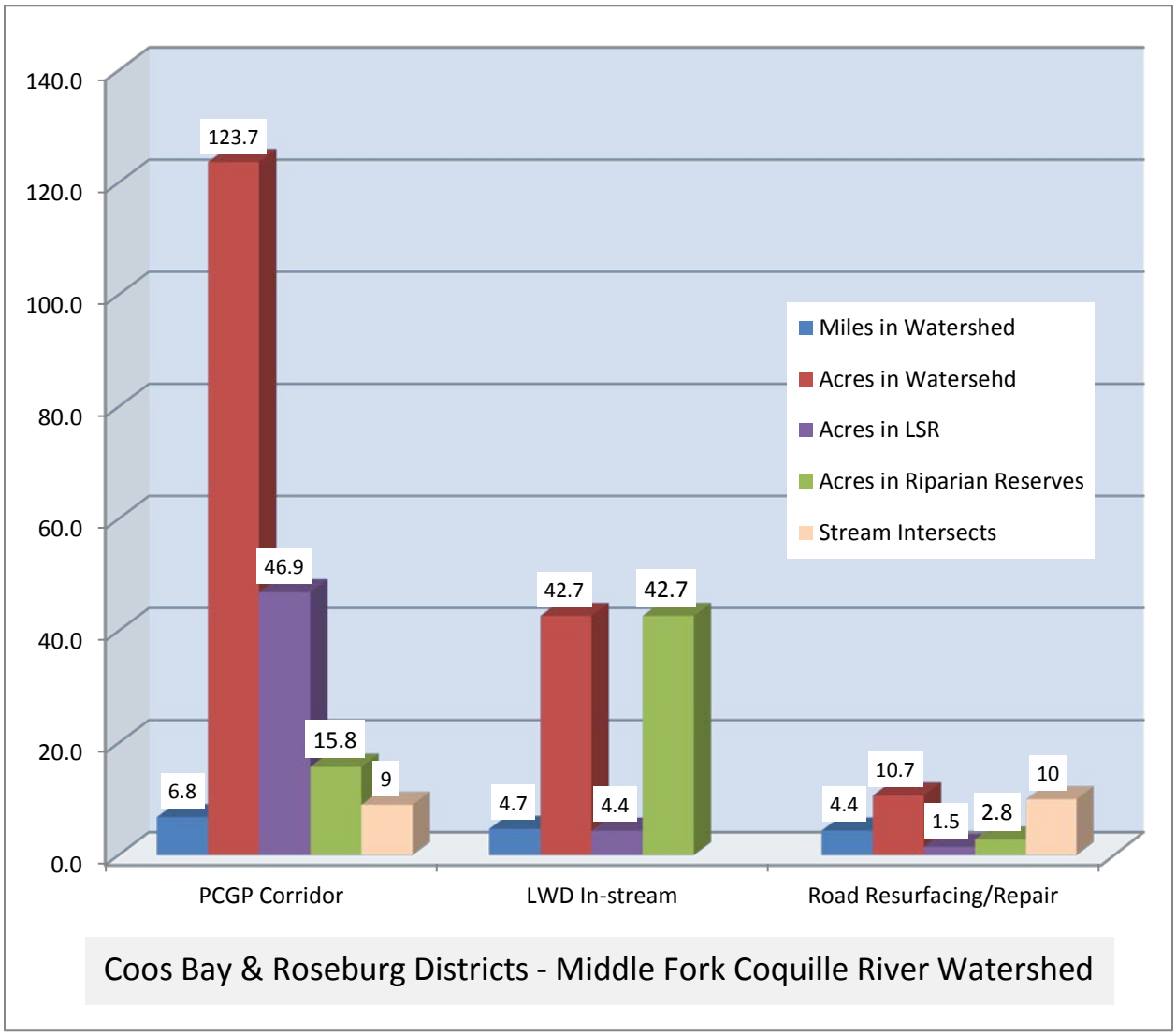


Figure 3-3b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Middle Fork Coquille Watershed

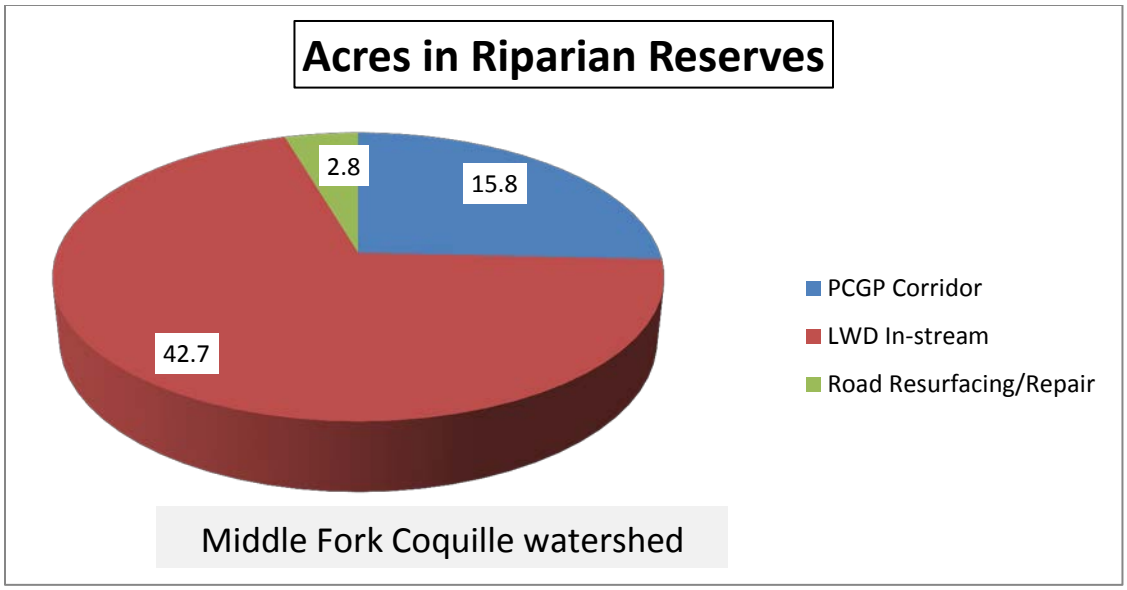


Figure 3-3c. Comparison of PCGP Impacts and Offsite Mitigation Actions in LSR in the Middle Fork Coquille Watershed

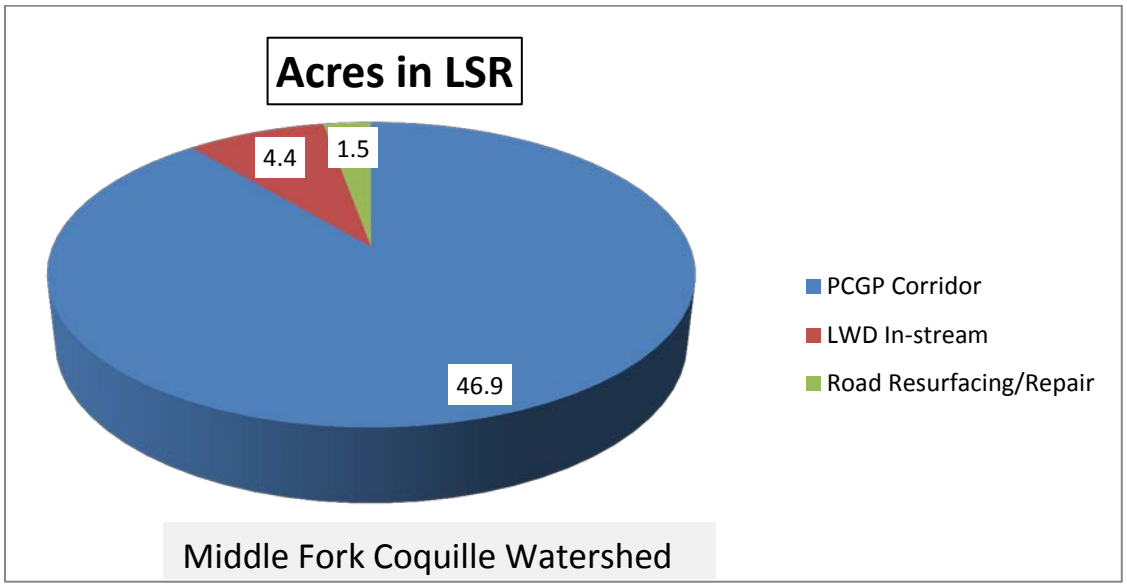


TABLE 3-4a

Mitigation Actions Proposed in the Olalla-Lookingglass Watershed on the BLM Roseburg District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Roseburg BLM	Olalla-Lookingglass	Reallocation of Matrix Lands to LSR	Land Re-Allocation from Matrix to LSR	Roseburg BLM	This action contributes to the "neutral to beneficial" standard for new developments in LSRs by adding acres to the LSR land allocation to offset the long-term loss of acres of acres and habitat from the construction and operation of the Project. In addition to impacts to Mapped LSR, this action compensates for impacts to 3 unmapped LSRs (KOACs).	409	acres
Roseburg BLM	Olalla-Lookingglass	Aquatic and Riparian Habitat	LWD In-stream	Olalla Creek In-stream LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project corridor. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	1.2	miles
Roseburg BLM	Olalla-Lookingglass	Road Sediment Reduction	Road Stabilization	Olalla Tie Road Renovation	Sediment from roads is a primary concern in this watershed. Roads in this watershed are a source of chronic sediment delivery to fish bearing streams. Additionally, there are several landslides crossing the road which need to be stabilized. Stabilizing these conditions would reduce the delivery of road-related sediments to channels.	1	project

TABLE 3-4b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Roseburg District Olalla-Lookingglass Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	1.3	24.5	4.3	0.0	0
LWD In-stream	1.2	7.3	6.7	7.3	
Road Stabilization	0.3	0.9	0.9	0.9	2

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LWD In-stream acres based on a 50' wide treatment area.
Road Stabilization acres based on a 30' wide treatment area.

Figure 3-4a. Comparison of PCGP Impacts and Offsite Mitigation in the Olalla-Lookingglass Watershed

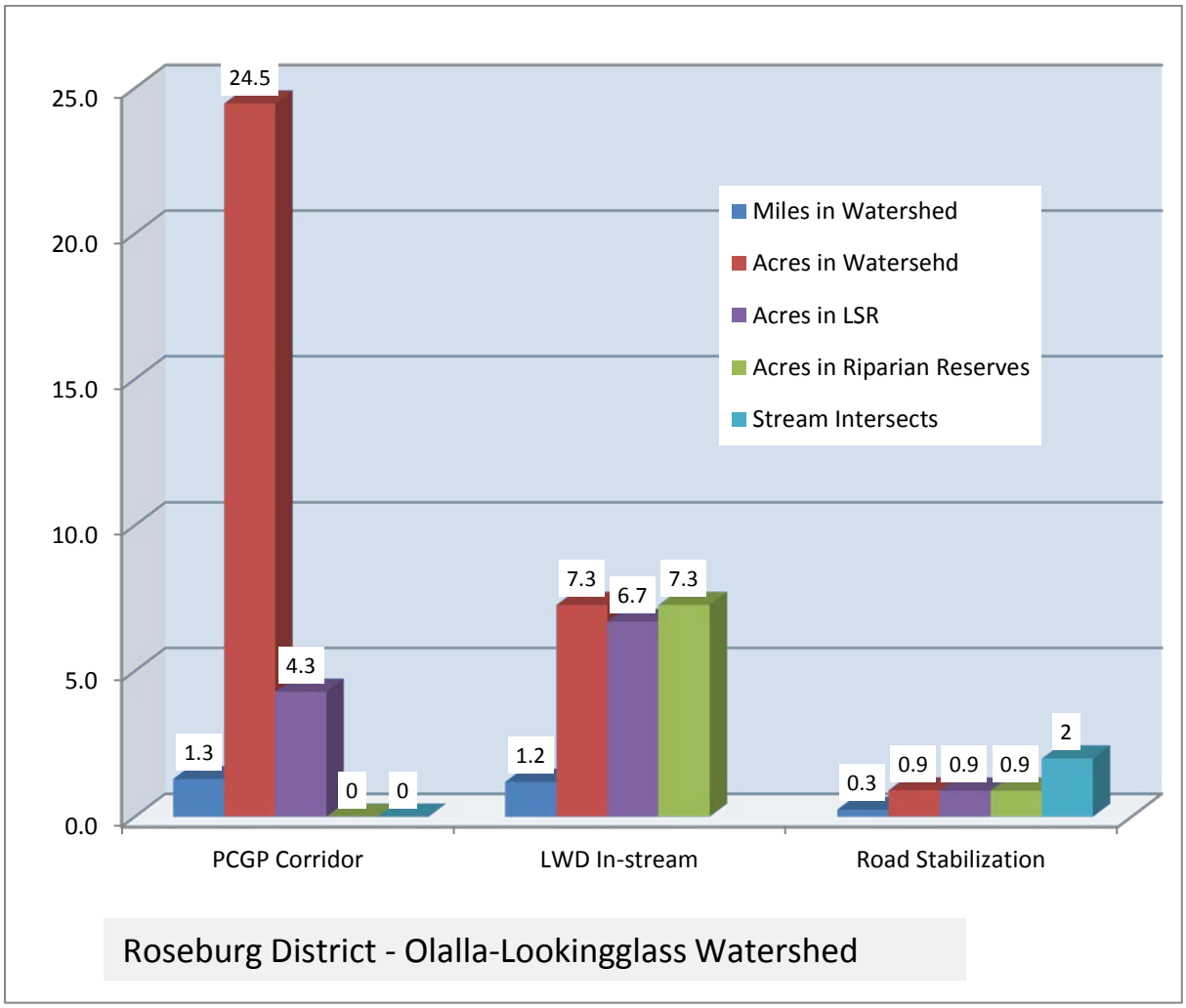


Figure 3-4b. Comparison of PCGP Impacts and Offsite Mitigation in LSR in the Olalla-Lookingglass Watershed

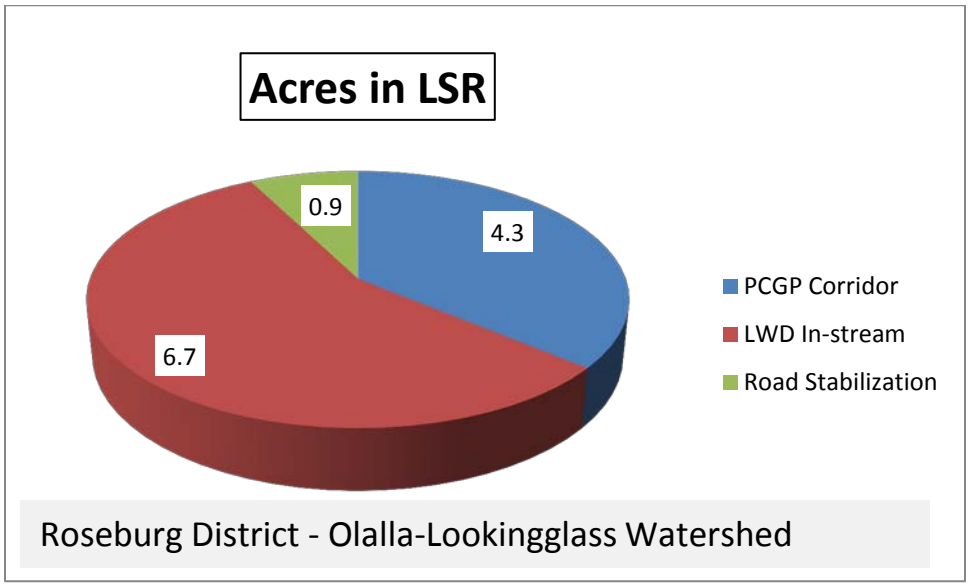


TABLE 3-5a

Mitigation Actions Proposed in the Clark Branch South Umpqua Watershed on the BLM Roseburg District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Roseburg BLM	Clark Branch South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Rice Creek Culvert Replacements	Man-made barriers to fish passage have negatively affected access to habitat in this watershed. Both culverts are undersized and obstruct anadromous and resident fish passage. Replacing the culverts with ones properly sized for the stream would allow for proper fish passage along with reducing the risk for culverts plugging and causing road fill failures.	2	sites
Roseburg BLM	Clark Branch South Umpqua	Road Sediment Reduction	Road Drainage - Culvert Replacement	East Fork Willis Creek Tributary Culvert Replacement	Sediment is one of the primary water quality problems in this watershed. WAs prepared by BLM clearly indicate that the sediment turbidity habitat indicator is at risk or more likely not functioning properly. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Culvert is plugged, old, undersized, shot-gunned, and eroding road fill. Culvert has poor alignment with the stream at the outlet. Replacing the culvert with a properly sized one would reduce the risk of road fill failure.	1	project
Roseburg BLM	Clark Branch South Umpqua	Road Sediment Reduction	Road Drainage - Culvert Replacement	Judd Creek Culvert Removal	Sediment is one of the primary water quality problems in this watershed. WAs prepared by BLM clearly indicate that the sediment turbidity habitat indicator is at risk or more likely not functioning properly. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. This culvert is undersized and has a large amount of road fill associated with it. Pulling the culvert and fill material and storm-proofing the road would prevent a plugged culvert. A plugged culvert could cause the road fill to fail which could deliver sediment downstream to fish bearing reaches. The road is blocked by a landslide just beyond so access would not be lost. Access to the stream crossing is gradually being lost due to soil slumping and vegetation growth.	1	project

TABLE 3-5b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Roseburg District Clarks Branch South Umpqua Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	0.6	11.3	0.0	0.1	0
Fish Passage		0.4	0.0	0.4	2
Culvert Replacement		0.4	0.0	0.4	2

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: Fish Passage and Culvert Replacement acres based on an estimate of 0.2 acres/site

Figure 3-5. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Clarks Branch South Umpqua Watershed

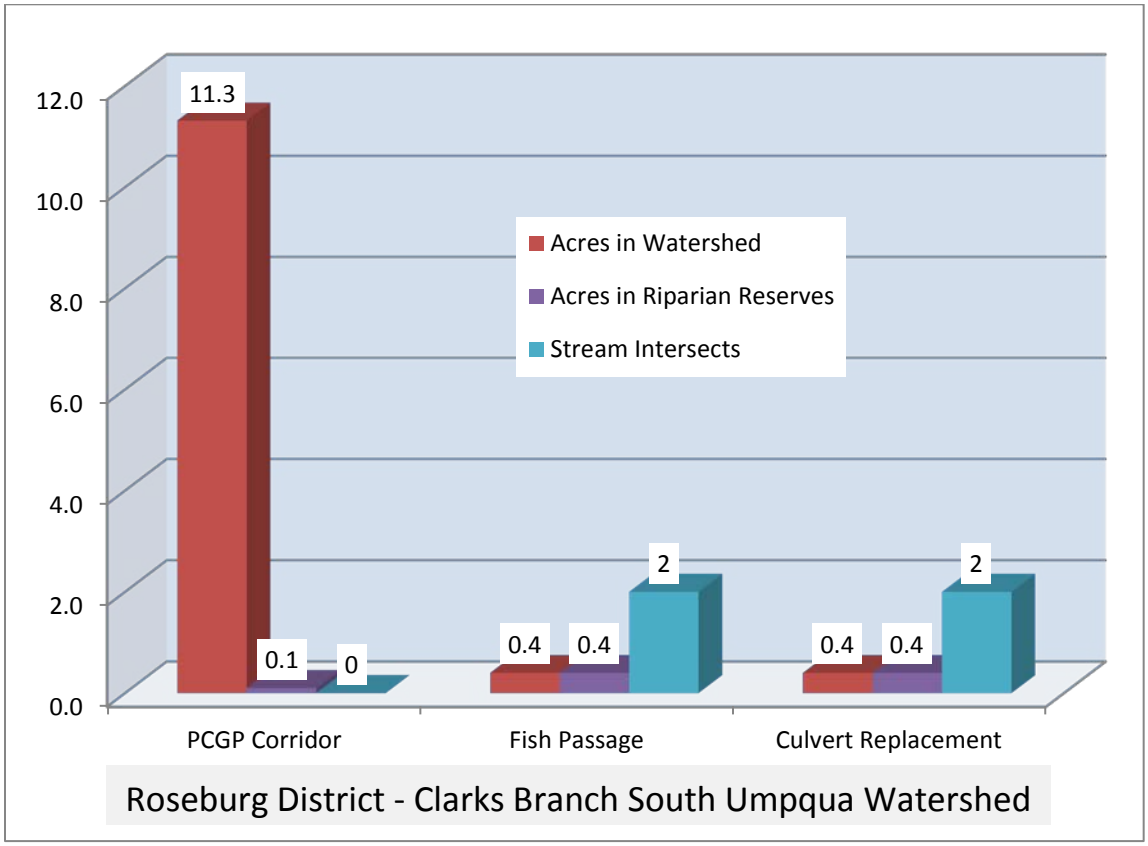


TABLE 3-6a

Mitigation Actions Proposed in the Myrtle Creek Watershed on the BLM Roseburg District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Roseburg BLM	Myrtle Creek	Aquatic and Riparian Habitat	Fish Passage	Slide Creek Culvert Replacement	Man-made barriers to fish passage have negatively affected access to habitat in this watershed. Culvert is perched, undersized, and a fish barrier for anadromous and resident fish. Replacing a fish barrier culvert with one that would pass adult and juvenile salmonids at a range of flows would extend the availability of upstream habitat, mitigating for reductions in habitat quality on stream reaches crossed by the pipeline corridor. In addition, undersized culverts are at risk of failure due to small size and age. This could result in the culvert plugging which could cause road fill to enter into the stream network.	1	project
Roseburg BLM	Myrtle Creek.	Road Sediment Reduction	Road Drainage and Surface Enhancement	Ben Branch Road Drainage and Surface Enhancement	Sediment in streams is a limiting factor in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Roads in this watershed are a source of chronic sediment delivery to fish bearing streams. Surfacing and drainage repair would reduce sediment delivery to fish bearing streams.	1.0	miles
Roseburg BLM	Myrtle Creek.	Road Sediment Reduction	Road Stabilization	South Myrtle Hill Slide Repair	Sediment in streams is a limiting factor in this watershed. There are approximately 3.4 miles of Project corridor in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Stabilizing the failure would prevent future sediment delivery and catastrophic slope failure.	1	project

TABLE 3-6b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Roseburg District Myrtle Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	2.5	86.9	1.1	4.2	0
Fish Passage		0.2	0.0	0.2	1
Road Resurfacing	1.0	2.4	0.0	1.4	6
Road Stabilization	0.3	0.9	0.0	0.9	1

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: Fish Passage acres based on an estimate of 0.2 acres/site
Road Resurfacing/Stabilization acres based on a 30' treatment area

Figure 3-6a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Myrtle Creek Watershed

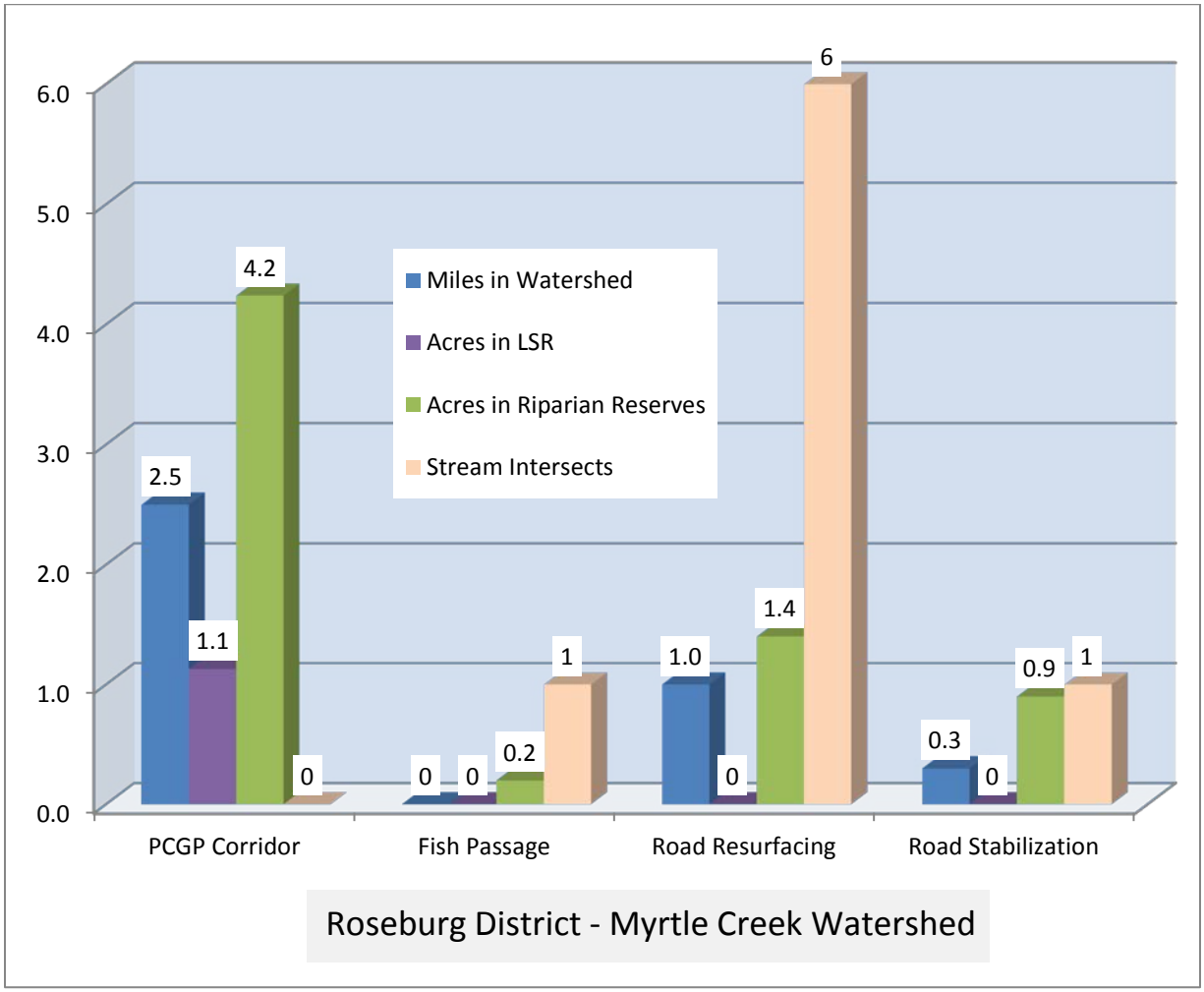


Figure 3-6b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Myrtle Creek Watershed

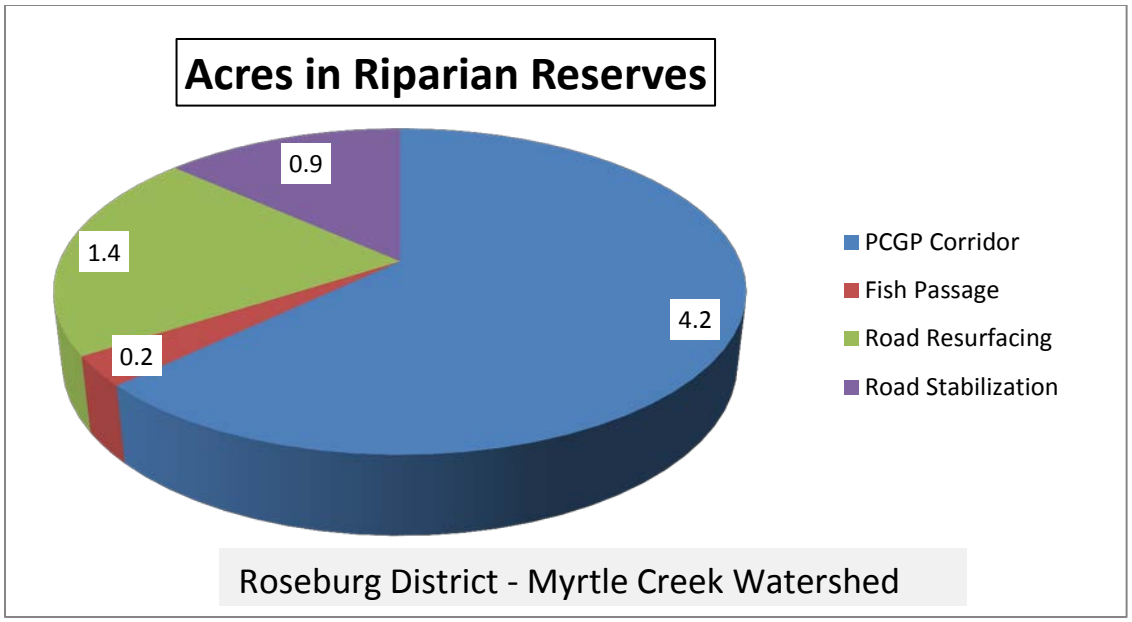


TABLE 3-7a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the BLM Roseburg District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Roseburg BLM	Days Creek. South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Beal Creek Culvert Replacement	Man-made barriers to fish passage have negatively affected access to aquatic habitat in this watershed. Both culverts are undersized and obstruct anadromous and resident fish passage. Replacing the culverts with ones properly sized for the stream would allow for proper fish passage along with reducing the risk for culverts plugging and causing road fill failures.	2	sites
Roseburg BLM	Days Creek. South Umpqua	Aquatic and Riparian Habitat	LWD In-stream	Days Creek In-stream LWD	The South Umpqua River watershed is a Tier 1 Key Watershed. Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project. There are approximately 6.23 miles of Project corridor and 3 stream crossings in this watershed. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	0.4	miles
Roseburg BLM	Days Creek. South Umpqua	Aquatic and Riparian Habitat	LWD In-stream	West Fork Canyon	The South Umpqua River watershed is a Tier 1 Key Watershed. Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project. There are approximately 6.23 miles of Project corridor and 3 stream crossings in this watershed. Implementation of the Project would result in the removal of LWD from the Riparian	0.8	miles

TABLE 3-7a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the BLM Roseburg District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.		
Roseburg BLM	Days Creek. South Umpqua	Fire suppression	Suppression Capacity	Dry Hydrants	By installing dry hydrants, the water source is disturbed the one time but there are several advantages. Fire vehicles would not need to be really close to the water to fill, decreasing risk of contamination, and they can fill out of some water sources that would otherwise need to be modified for use. Areas that have had restoration work for fish populations could still be safety accessed for fire suppression. Over all, better water sources would improve suppression success and therefore help protect natural resources.	6	sites
Roseburg BLM	Days Creek. South Umpqua	Road Sediment Reduction	Road storm-proofing	31-4-3.2 Road Storm-proofing	The South Umpqua River watershed is a Tier 1 Key Watershed. Sediment is likely the most limiting factor to aquatic function in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. If culverts fail, substantial sediment could be transported to Shively Creek. Removing culverts would prevent crossing failures that deposit fine road sediments in stream channels. This project should occur before road becomes too overgrown for heavy equipment access.	1	project
Roseburg BLM	Days Creek. South Umpqua	Road Sediment Reduction	Road Drainage and Surface	South Umpqua Road	The South Umpqua River watershed is a Tier 1 Key Watershed. There are	10	miles

TABLE 3-7a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the BLM Roseburg District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
			Enhancement	Drainage and Surface Enhancement	approximately 6.23 miles of Project corridor and 3 stream crossings in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Sediment is likely the most limiting factor to aquatic function in this watershed. Roads in this watershed are a source of chronic sediment delivery to fish bearing streams. Surfacing and drainage repair would reduce sediment delivery to fish bearing streams.		
Roseburg BLM	Days Creek. South Umpqua	Stand Density Fuel Break	Fuels Reduction	Days Creek South Umpqua Hazardous Fuel Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project and associated activities removes both mature and developing stands and would increase fire suppression options however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This project is part of the Days Creek to Shady Cove fuel break and ties in with similar projects on the Umpqua NF.	1000	acres

TABLE 3-7b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Roseburg District Days Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	6.6	186.6	57.5	8.9	1
Fish Passage		0.2	0.0	0.2	1
Hazardous Fuels Reduction		1000.0	305.0	78.0	
Road Resurfacing	10.0	24.2	15.8	3.2	14
LWD In-stream	1.2	7.3	0.0	7.3	1

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: Fish Passage acres based on an estimate of 0.2 acres/site
Road Resurfacing/Stabilization acres based on a 20' treatment area
Hazardous Fuels Reduction Acres in Riparian Reserves is estimated

Figure 3-7a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Days Creek South Umpqua Watershed

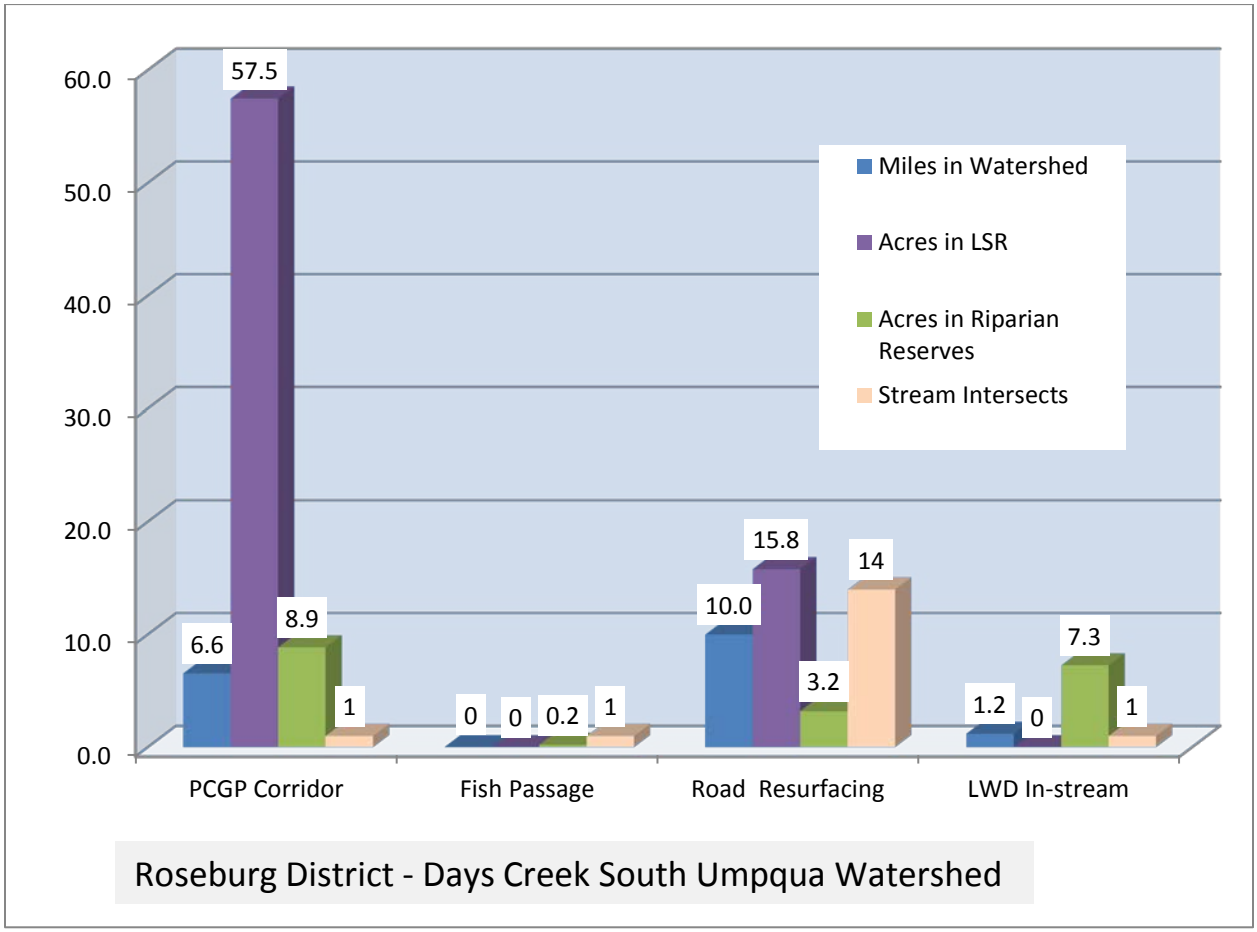


Figure 3-7b. Comparison of PCGP Impacts and Offsite Mitigation Actions in LSR in the Days Creek South Umpqua Watershed

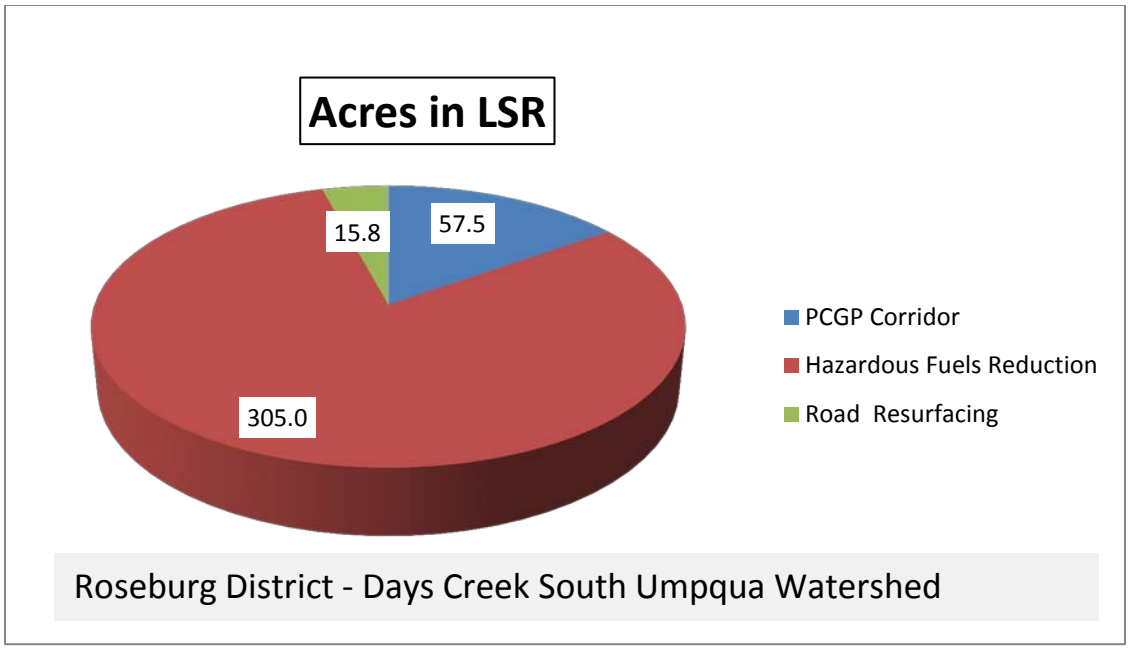


TABLE 3-8a

Mitigation Actions Proposed in the Trail Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Medford BLM	Trail Creek.	Aquatic and Riparian Habitat	LWD In-stream	Trail Creek LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.6	miles

TABLE 3-8a

Mitigation Actions Proposed in the Trail Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Medford BLM	Trail Creek.	Fire suppression	Suppression Capacity	Trail Creek Pump Chance	Construction of the Project would increase fire suppression complexity in the watershed. Pump chances increase capacity for agency response and help reduce potential fire losses to valuable habitats by providing readily available water sources.	8	sites
Medford BLM	Trail Creek.	Road Sediment Reduction	Road storm-proofing	Trail Creek Road Storm-proofing	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including possible impacts to flow and sediment regimes. Storm-proofing improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	4.3	miles
Medford BLM	Trail Creek.	Road Sediment Reduction	Road Decommissioning	Trail Creek Road Decommissioning	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Road decommissioning reduces habitat fragmentation, reduces road-related sediment and improves hydrologic connectivity and by reducing road density.	2.7	miles
Medford BLM	Trail Creek.	Road Sediment Reduction	Road Surfacing	Trail Creek Road Resurface	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-related sediment that could be delivered to stream channels.	16.3	miles

TABLE 3-8a

Mitigation Actions Proposed in the Trail Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Medford BLM	Trail Creek.	Stand Density Fuel Break	Fuels Reduction	Trail Creek Fuel Hazard Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on the Umpqua NF.	687	acres
Medford BLM	Trail Creek.	Stand Density Fuel Break	Fuels Reduction	Trail Creek. Fuels Hazard Maintenance	This provides a mechanism for maintenance of fuel breaks over time for the life of the project.	687	acres

TABLE 3-8b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Medford District Trail Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	3.9	74.2	0.0	5.1	2
Hazardous Fuels Reduction	0.0	687.0	0.0	78.0	0
Road Decommissioning	2.7	6.5	0.0	2.0	9
Road Resurfacing - Storm-proofing	20.6	49.9	0.0	8.5	39
LWD In-stream	2.6	15.8	0.0	15.8	0

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LWD In-stream acres based on an estimate of a 50' wide treatment area
Road Resurfacing/Stabilization acres based on a 20' treatment area

Figure 3-8a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Trail Creek Watershed

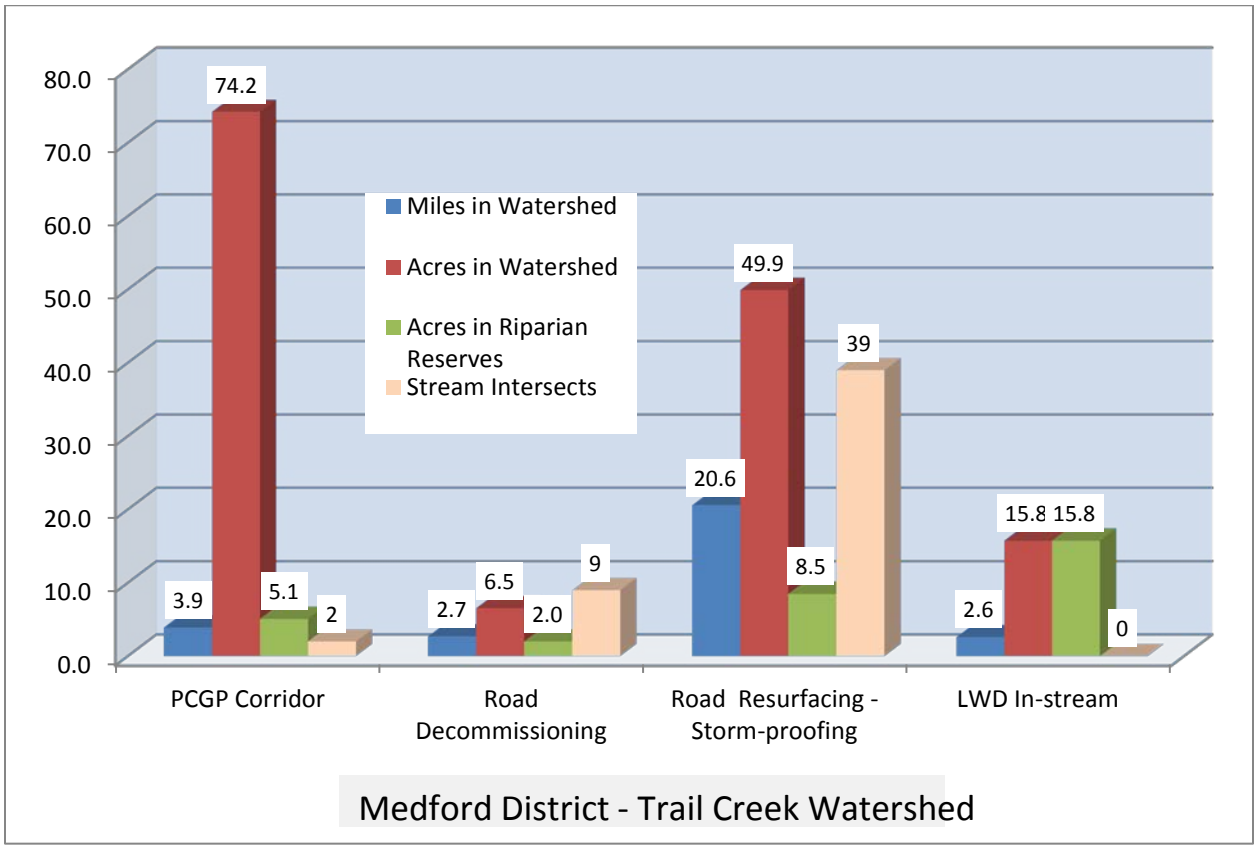


Figure 3-8b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Trail Creek Watershed

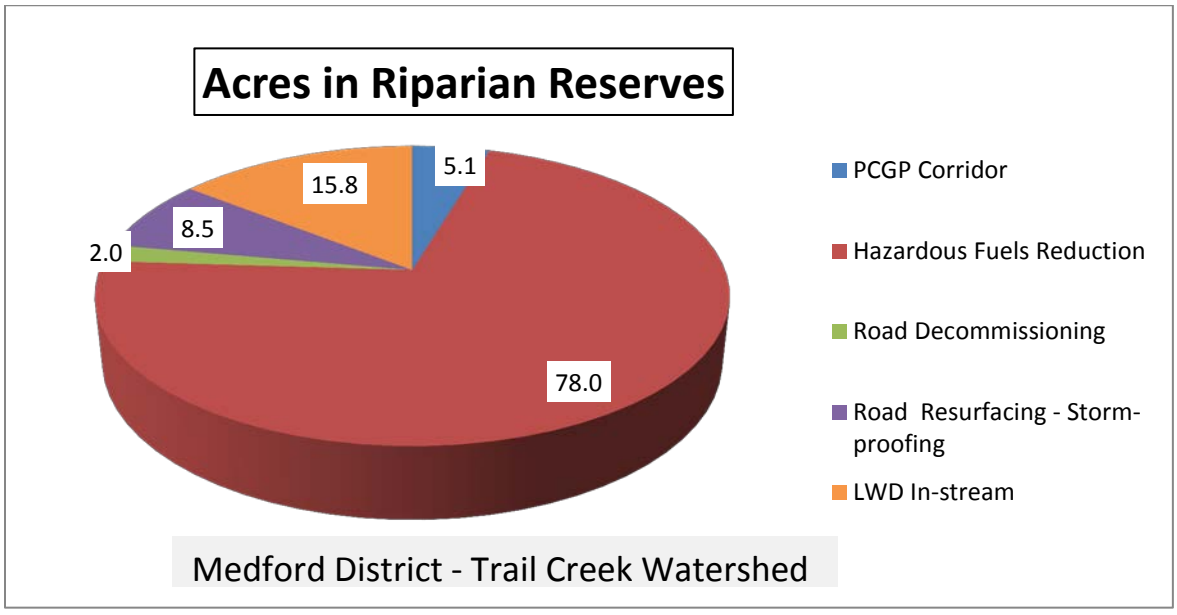


TABLE 3-9a

Mitigation Actions Proposed in the Shady Cove-Rogue River Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Medford BLM	Shady Cove Rogue River	Aquatic and Riparian Habitat	LWD In-stream	Shady Cove LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.5	miles
Medford BLM	Shady Cove Rogue River	Road Sediment Reduction	Road Drainage and Surface Enhancement	Shady Cove Road Improvement	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	1.0	mile
Medford BLM	Shady Cove Rogue River	Road Sediment Reduction	Road Surfacing	Shady Cove Road Resurface	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-related sediment that could be delivered to stream channels.	1.5	miles
Medford BLM	Shady Cove Rogue River	Stand Density Fuel Break	Fuels Reduction	Shady Cove Fuel Hazard Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the pipeline and associated activities removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels	866	acres

TABLE 3-9a

Mitigation Actions Proposed in the Shady Cove-Rogue River Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on the Umpqua NF.		
Medford BLM	Shady Cove Rogue River	Stand Density Fuel Break	Fuels Reduction	Shady Cove Fuel Hazard Maintenance	This provides a mechanism for maintenance of fuel breaks over time for the life of the Project.	866	acres

TABLE 3-9b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Medford District Shady Cove Rogue River Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	4.4	75.5	0.0	4.8	7
Hazardous Fuels Reduction	0.0	866.0	0.0	206.0	0
Road Resurfacing - Improvement	2.5	6.1	0.0	0.7	3
LWD In-stream	2.5	15.2	0.0	15.2	0

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LWD In-stream acres based on an estimate of a 50' wide treatment area
Road Resurfacing - Improvement acres based on a 20' treatment area

Figure 3-9a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Shady Cove Rogue River Watershed

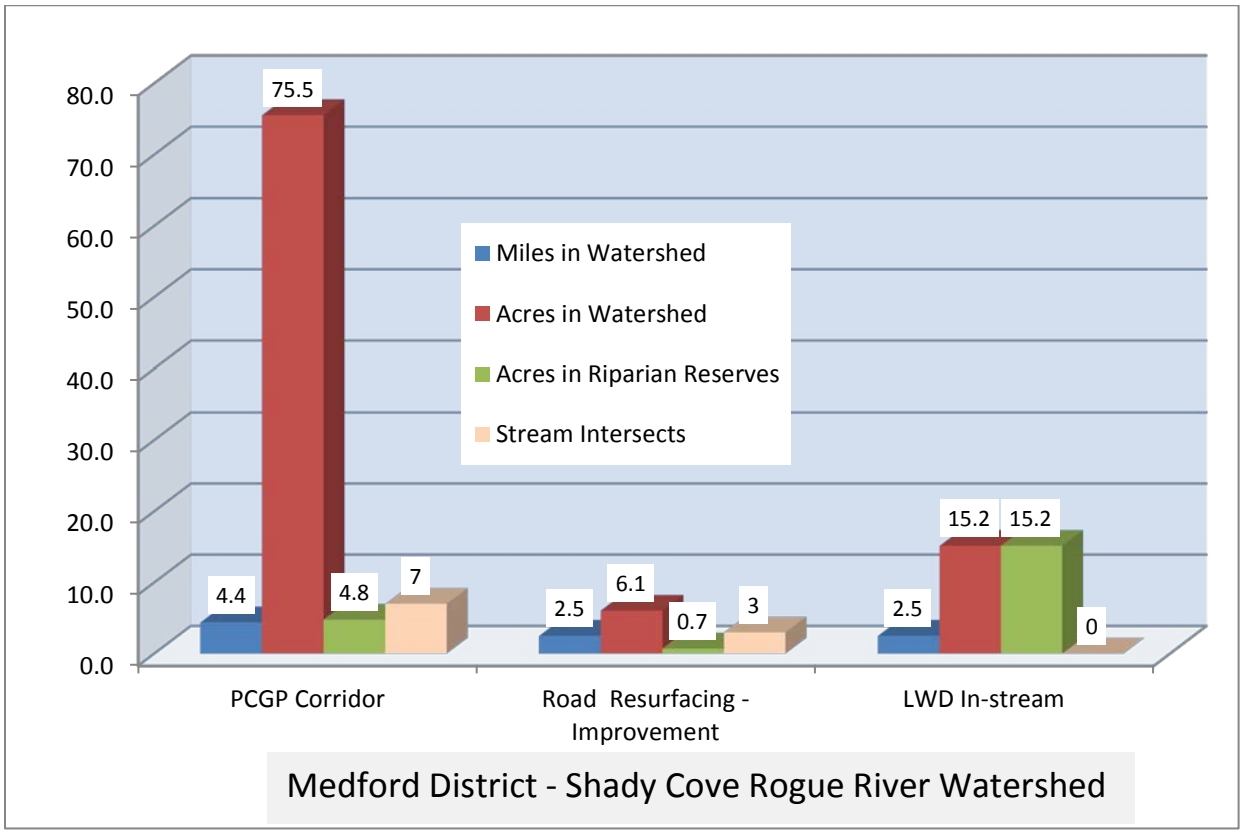


Figure 3-9b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Shady Cove Rogue River Watershed

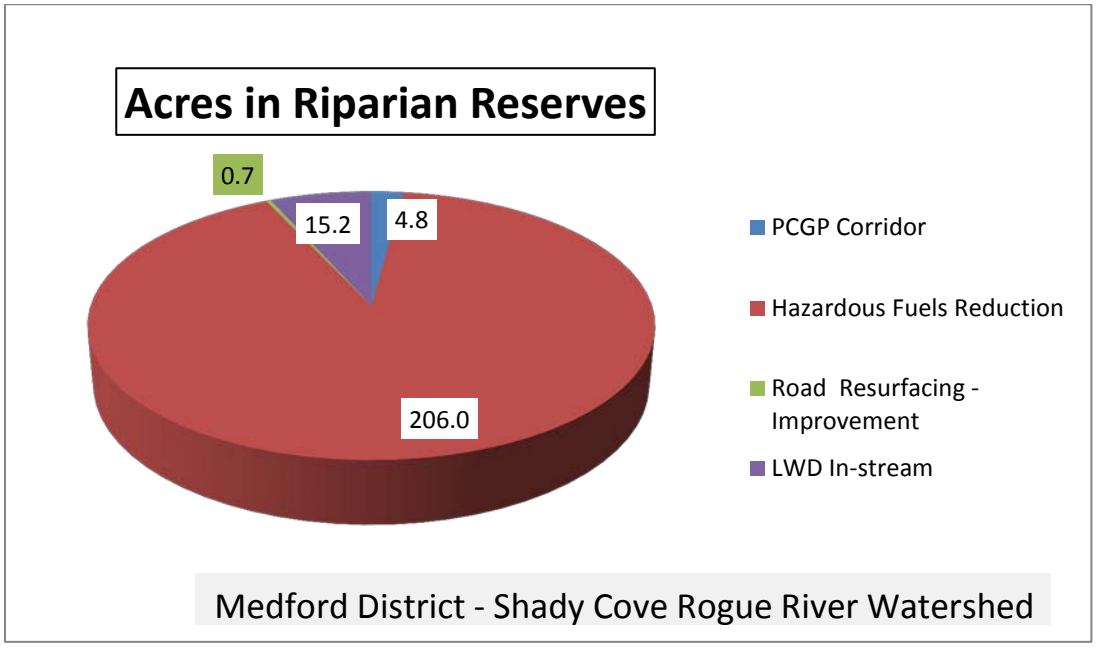


TABLE 3-10a

Mitigation Actions Proposed in the Big Butte Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Medford BLM	Big Butte Creek.	Fire suppression	Suppression Capacity	Big Butte Creek Pump Chance	Construction of the Project would increase fire suppression complexity. Pump chances increase capacity for agency response and help reduce potential fire losses to valuable habitats by providing readily available water sources.	1	sites
Medford BLM	Big Butte Creek.	Road Sediment Reduction	Road storm--proofing	Big Butte Creek. Road Storm-proofing	Sediment was identified by the Upper Rogue Watershed Council as a factor that limited aquatic habitat in this watershed. The effects of the Project are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	6.4	miles
Medford BLM	Big Butte Creek.	Terrestrial Habitat Improvement	Habitat Planting	Big Butte Creek. Fritillaria Habitat	The Project may impact habitat of Fritillaria gentneri. Out-planting to suitable habitat locations is recommended in the recovery plan for this species.	600	acres

TABLE 3-10b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Medford District Big Butte Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	0.7	11.7	0.0	6.9	4
Road Storm-proofing	6.4	15.5	0.0	2.1	10

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: Road Stormproofing acres based on a 20' wide treatment area

Figure 3-10a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Big Butte Creek Watershed

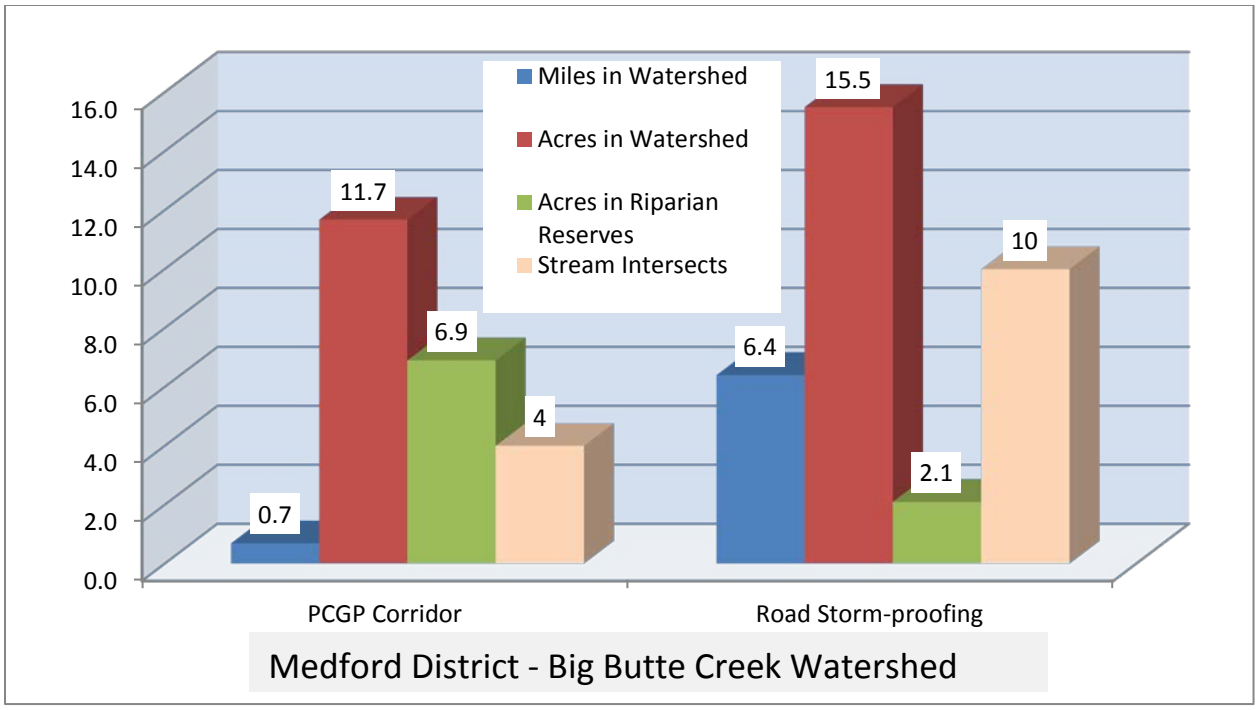


Figure 3-10b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Big Butte Creek Watershed

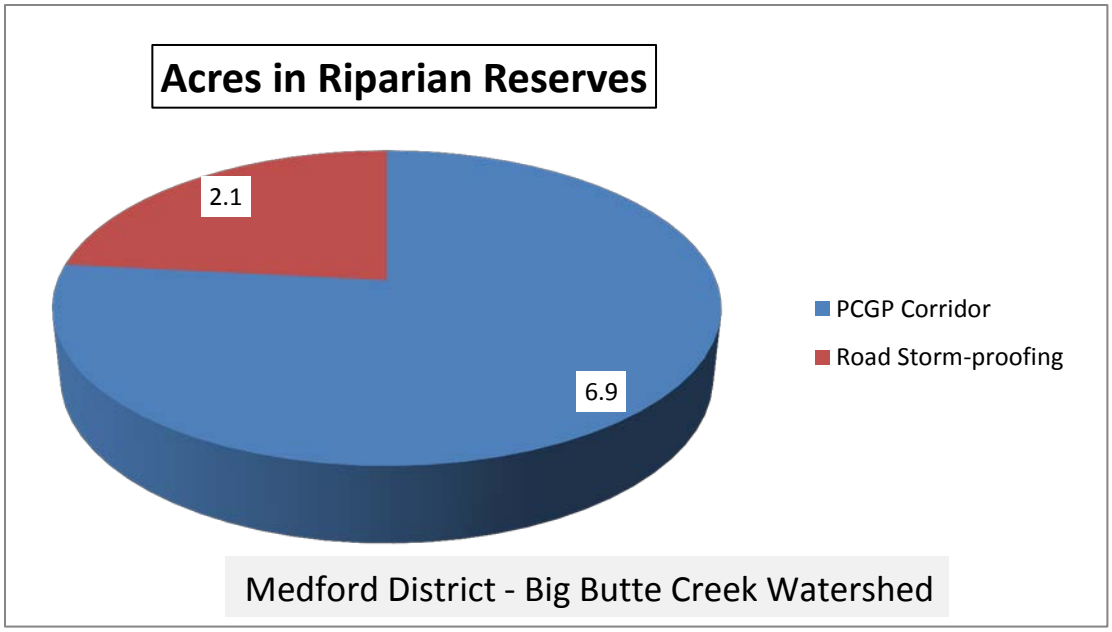


TABLE 3-11a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Medford BLM	Little Butte Creek	Aquatic and Riparian Habitat	Fish Passage	Little Butte Creek Fish Screen	Irrigation diversions have negatively impacted fisheries in Little Butte Creek watershed by causing entrapment. There is a private irrigation ditch with an unscreened diversion and associated push up dam on BLM land in the lower 1.5 miles of Lost Creek. The unscreened ditch is currently accessible to juvenile and adult fish, creating a stranding hazard with limited return access to the main channel. The push up dam is constructed at the beginning of the irrigation season and removed at the end of the season. This stream provides habitat for Coho salmon and steelhead trout; building a push up dam in Lost Creek each season disturbs the bed and banks of the channel, generates sediment and creates an unnecessary disturbance during steelhead spawning season. Creating a permanent diversion structure, possibly in the form of a boulder weir, would divert water without yearly maintenance and would provide for both upstream and downstream fish passage.	1	site
Medford BLM	Little Butte Creek	Aquatic and Riparian Habitat	LWD In-stream	Lost Creek In-stream LWD	The Little Butte Creek watershed is a Tier 1 Key Watershed. Lost Creek provides habitat for Coho salmon and steelhead trout. Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Project. Implementation of the Project would result in the removal of LWD from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel would preclude future recruitment of LWD into the channel and associated Riparian Reserves. Placing LWD at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes	8.6	miles

TABLE 3-11a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					to the accomplishment of ACS objectives.		
Medford BLM	Little Butte Creek	Fire suppression	Suppression Capacity	Little Butte Creek Pump Chance	Construction of the Project would increase fire suppression complexity. Pump chances increase capacity for agency response and help reduce potential fire losses to valuable habitats by providing readily available water sources.	8	sites
Medford BLM	Little Butte Creek	Road Sediment Reduction	Road Drainage and Surface Enhancement	Little Butte Creek Road Improvement	The Little Butte Creek watershed is a Tier 1 Key Watershed. Sediment has been identified by the Little Butte Creek Watershed Council as a limiting factor for aquatic habitat in this watershed. The Project has approximately 6 miles of corridor and 7 stream crossings on BLM lands in this watershed. The effects of the Project are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	3.5	miles
Medford BLM	Little Butte Creek	Road Sediment Reduction	Road Decommissioning	Little Butte Creek Road Decommissioning	The Little Butte Creek watershed is a Tier 1 Key Watershed. Sediment has been identified by the Little Butte Creek Watershed Council as a limiting factor for aquatic habitat in this watershed. There are approximately 6 miles of the Project corridor and 7 stream crossings on BLM lands in this watershed. The effects of the Project are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Road decommissioning reduces habitat fragmentation, reduces road-related sediment and improves hydrologic connectivity by reducing road density.	13.0	miles
Medford BLM	Little Butte Creek	Road Sediment Reduction	Road Surfacing	Little Butte Creek Road Resurfacing	The Little Butte Creek watershed is a Tier 1 Key Watershed. The Project has approximately 6 miles of corridor and 7 stream crossings on BLM lands in this watershed. The effects of the Project are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-	18.3	miles

TABLE 3-11a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the BLM Medford District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					related sediment that could be delivered to stream channels.		

TABLE 3-11b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Medford District Little Butte Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	6.0	107.9	0.0	8.4	7
Road Decommissioning	13.0	31.5	0.3	3.5	16
Road Resurfacing - Improvement	21.9	52.1	0.5	11.4	52
LWD In-stream	8.6	15.2	0.4	15.2	0

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LWD In-stream acres based on an estimate of a 50' wide treatment area
Road Resurfacing - Improvement acres based on a 20' wide treatment area

Figure 3-11a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Little Butte Creek Watershed

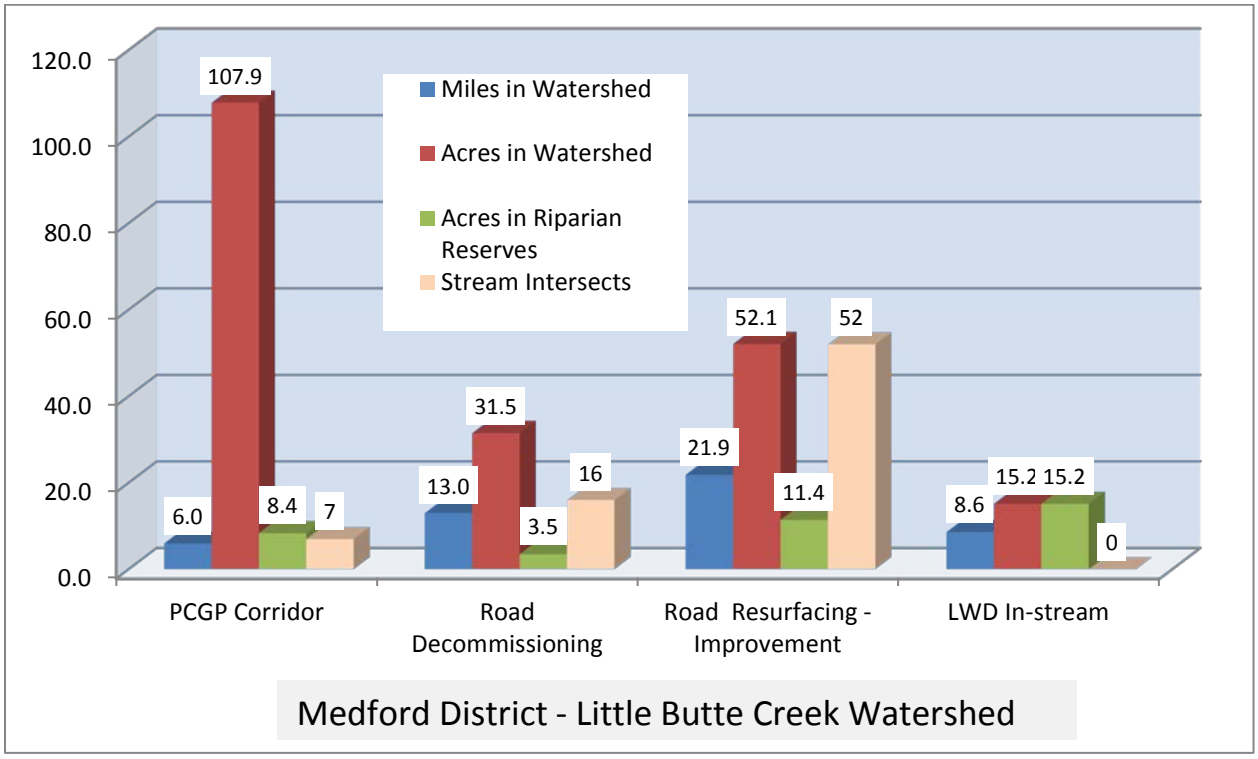


Figure 3-11b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Little Butte Creek Watershed

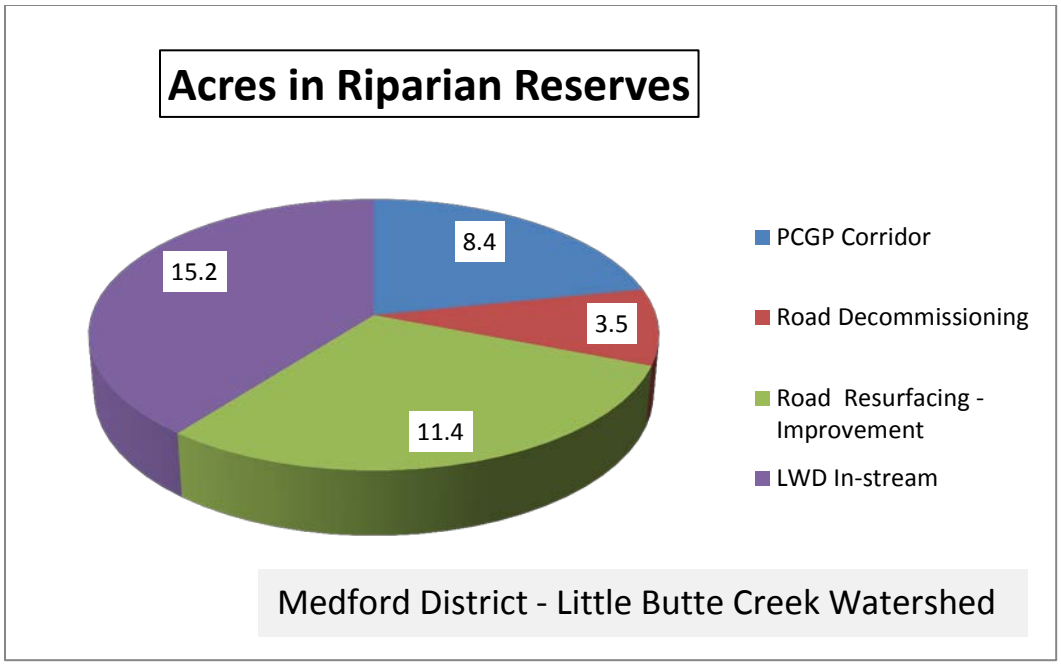


TABLE 3-12a

Mitigation Actions Proposed in the Spencer Creek Watershed on the BLM Lakeview District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Lakeview BLM	Spencer Creek	Stand Density Fuel Break	Riparian Vegetation	Upper Spencer Creek And Miners Creek LSR/Riparian treatment	The Spencer Creek watershed is a Tier 1 Key Watershed. Implementation of the Project would require removal of riparian vegetation, thereby influencing the form and function of Riparian Reserves in this watershed. This project would thin, pile and burn dense white fir understory vegetation and fall occasional trees into these stream channels to function as LWD. This would enhance forest health and diversity with these Riparian Reserve and associated LSR by restoring stand density to more natural and sustainable levels. This contributes to forest health and sustainability of riparian reserves by increasing resistance to insect and disease losses and reducing the risk of stand replacing fire. LWD in stream channels contributes to meeting water quality and TMDL targets and provides habitat for sensitive fish and invertebrate species.	6.0	miles

TABLE 3-12a

Mitigation Actions Proposed in the Spencer Creek Watershed on the BLM Lakeview District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Lakeview BLM	Spencer Creek	Stand Density Fuel Break	Riparian Vegetation	Tributary Creek Riparian Thinning	The Spencer Creek watershed is a Tier 1 Key Watershed. Implementation of the Project would require removal of riparian vegetation, thereby influencing the form and function of Riparian Reserves. Thinning would restore forest health and diversity in riparian reserves and stands near streams that are currently overstocked. Thinning would be done in a way that emulates the natural "patchiness" of disturbance events.	70	acres
Lakeview BLM	Spencer Creek	Road Sediment Reduction	Road Drainage - Culvert Replacement	Keno Access Road Repair and Culvert Replacement	The Spencer Creek watershed is a Tier 1 Key Watershed. Although BMPs and other project measures would be implemented, the Project would have road-like watershed impacts if constructed, including mobilization of sediment and possible alteration of hydrologic regimes. The existing stream crossing (culvert) is undersized in both length and diameter, therefore it ability to meet ACS objectives is minimized. The culvert underlying the existing road bed periodically causes erosion of the road prism and adjacent upland and riparian areas. Replacement of the culvert would allow stabilization of the road shoulder and reduce sediment input to Miner's Creek and ultimately into Spencer Creek. If this work is not completed, the condition would eventually lead to increased sedimentation. Replacement of this drainage structure would decrease road-related erosion, increase the hydrologic capacity of the crossing and enhance aquatic connectivity for fish and other aquatic organisms.	1	site
Lakeview BLM	Spencer Creek	Road Sediment Reduction	Road Drainage	Spencer Creek Drainage Improvements and Sediment Trap Removal	The Spencer Creek watershed is a Tier 1 Key Watershed. Although BMPs and other project measures would be implemented, the Project would have watershed impacts if constructed, including mobilization of sediment and possible alteration of hydrologic regimes. The project also uses a number of roads for access and construction. Drainage improvements and removing non-functioning cross drains and sediment traps at selected locations would benefit	15	sites

TABLE 3-12a

Mitigation Actions Proposed in the Spencer Creek Watershed on the BLM Lakeview District

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					aquatic habitat/connectivity by restoring drainage and reducing sediment transport.		
Lakeview BLM	Spencer Creek	Road Sediment Reduction	Road Closure	Spencer Creek Repair Existing Road Closure	Roads negatively impact wildlife in this watershed. Implementation of the Project would have road-like impacts on wildlife and require use of a large number of permanent and temporary roads and other access routes. Road closures (barricades) were established in the watershed to reduce road density to meet LMP objectives for both the aquatic conservation strategy and reduce impacts to wildlife. This project repairs the existing closure structures to ensure that road closures remain effective. Spencer Creek is a Tier 1 Key Watershed. Maintaining road closures also reduces sediment by keeping closed roads re-vegetated.	12	sites
Lakeview BLM	Spencer Creek	Stand Density Fuel Break	Stand Density Habitat	Upper Spencer Creek LSR Density Mgt.	Implementation of the Project would require removal of LSOG forest habitat, including critical habitat for NSO. Stand density management reduces the risk of stand replacing fire and accelerates the development of late-successional stand conditions which may benefit NSO.	270	acres

TABLE 3-12b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

BLM Lakeview District Spencer Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor	1.0	14.9	0.0	2.1	5
Riparian Thinning		70.0	11.0	70.0	
LSR Riparian Treatment	6.0	72.7	6.9	47.8	
LSR Density Management	0.0	270.0	95.0	33.0	
Road Closures				1.7	3

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: LSR Riparian Treatment acres based on an estimate of a 100' wide treatment area

Figure 3-12a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Spencer Creek Watershed

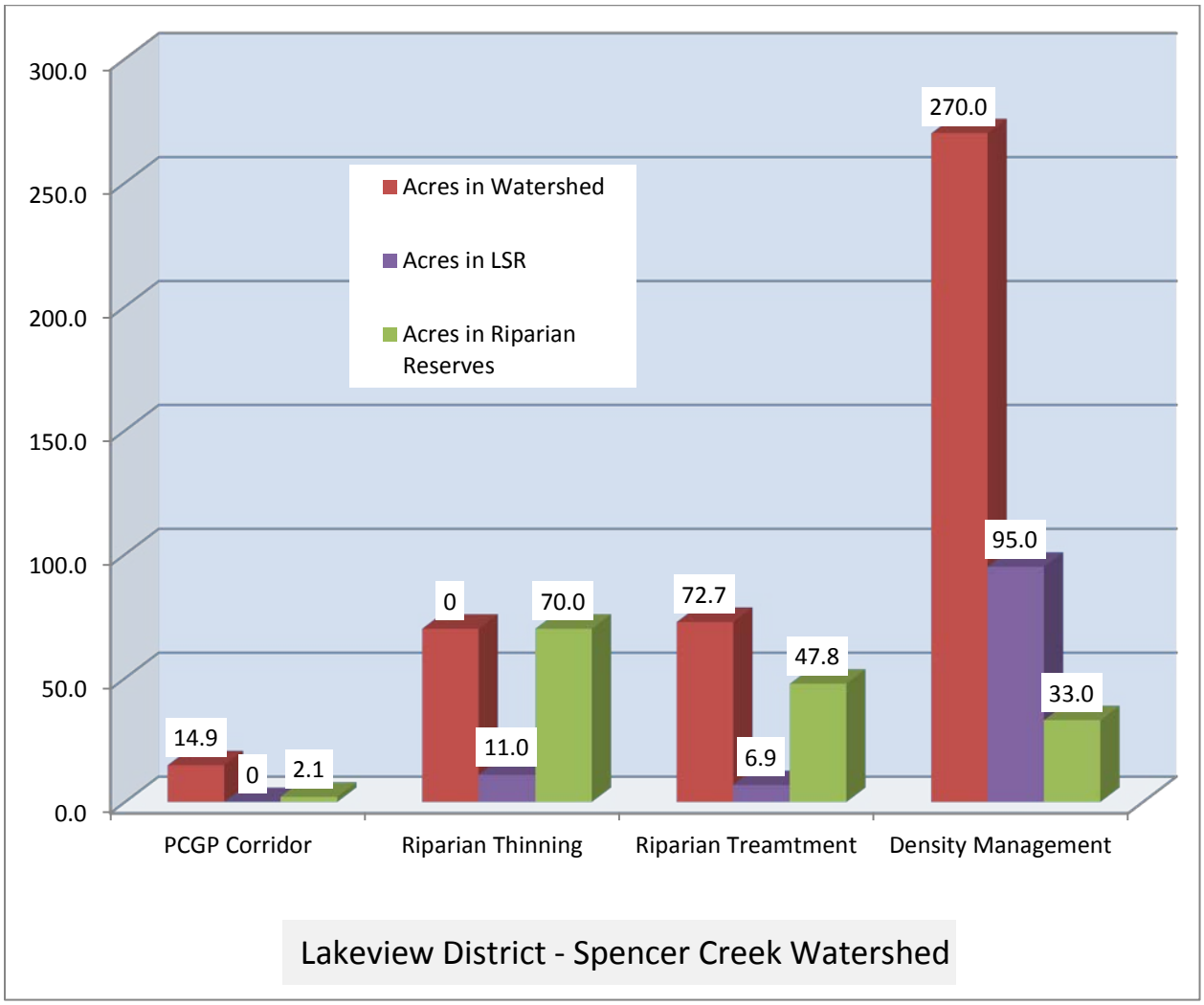
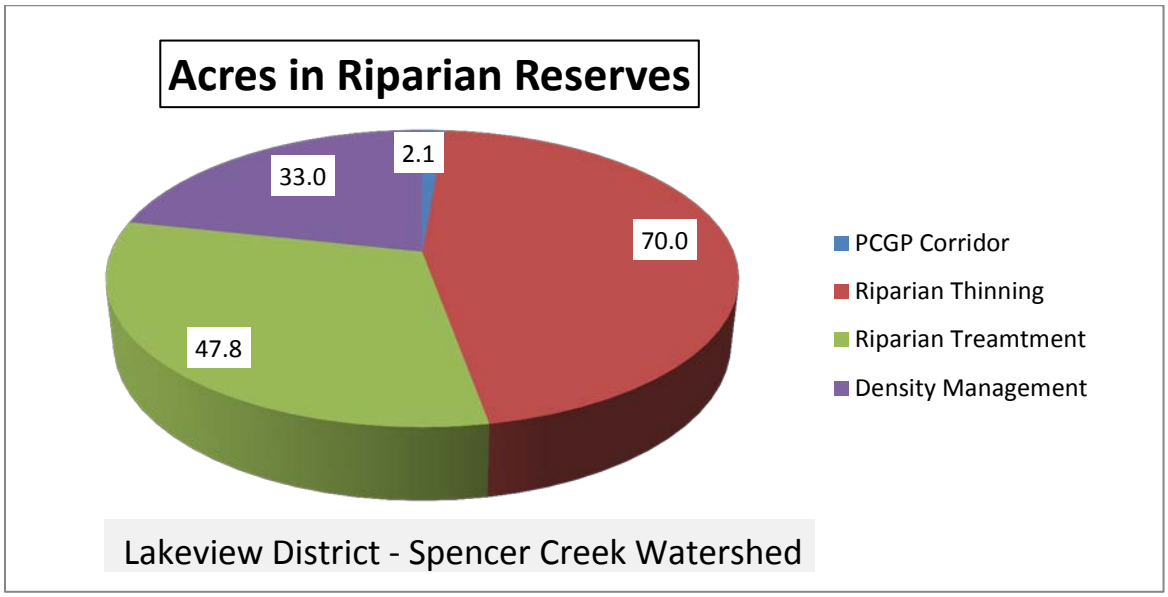


Figure 3-12b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian reserves in the Spencer Creek Watershed



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4.0 DESCRIPTION OF PROPOSED FOREST SERVICE MITIGATION ACTIONS BY FIFTH-FIELD WATERSHED

The following tables and figures describe the proposed mitigation actions by Forest Service administrative unit and fifth-field watershed. The Project impacts include the corridor, the TEWAs, and the UCSAs. Quantities are approximate estimates. Maps of the proposed mitigation actions are included in section 5 of this appendix.

TABLE 4-1a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Days Creek South Umpqua	Road sediment reduction	Road Closure	Days Creek South Umpqua Road Closure	Mowing and maintenance of the Project corridor, temporary road construction, and road use are direct disturbance impacts to wildlife. Road closure would mitigate some of those impacts, improve interior stand connectivity and benefit aquatic habitats over time.	0.5	Miles
Umpqua NF	Days Creek South Umpqua	Stand Density Fuel Break	Fuels Reduction	Days Creek South Umpqua Matrix Integrated Fuels Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on BLM's Roseburg District.	150.3	Acres

TABLE 4-1a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Days Creek South Umpqua	Stand Density Fuel Break	Fuels Reduction	Days Creek South Umpqua LSR Integrated Fuels Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on BLM lands.	231.5	Acres
Umpqua NF	Days Creek South Umpqua	Stand Density Fuel Break	Pre-commercial Thinning	Days Creek South Umpqua LSR Pre-commercial Thinning	The Project would cause direct impacts to existing and developing interior habitat. The Project would result in additional fragmentation and preclude the recovery of fragmented habitat for those stands adjacent to the Project corridor. Maintenance of the corridor would provide a continued vector for predators, early-seral species and non-native species. Also the project would result in a direct loss in biological services provided by attributes of mature forest for many decades past the life of the PCGP Project. Both mature stands and developing stands would be removed during Project construction. Density management of forested stands would assist in the recovery of late-seral habitat, impact from fragmentation, reduction in edge effects and enhance resilience of mature stands. Accelerating development of mature forest characteristics would shorten the impacts of those biological services loss due to the Project. Thinning of young stands is a recognized treatment within LRSs if designed to accelerate development of late-successional habitat characteristics (USDA FS; USDI BLM 1994b Pages B-11, C-11, C1-2, and C-17).	52.8	Acres

TABLE 4-1a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Days Creek South Umpqua	Stand Density Fuel Break	Under-burn	Days Creek South Umpqua LSR Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of the PCGP Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the project. The proposed mitigation is centered on the ecological values associated with LSOG habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable habitat late-seral forest. The proposed ridge line pipeline route intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation action would assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.	125	Acres

TABLE 4-1a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Days Creek South Umpqua	Stand Density Fuel Break	Under-burn	Days Creek South Umpqua Matrix Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the project. The proposed mitigation is centered on the ecological values associated with late-successional habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable LSOG habitat. The proposed ridge line pipeline route intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.	102	Acres

TABLE 4-1a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Days Creek South Umpqua	Terrestrial Habitat Improvement	Snag Creation	Days Creek South Umpqua LSR Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the Project right-of-way. The project prevents development of large snags during the life of the project and for decades after. Project construction would result in loss of snag habitat on approximately 775 acres.. This project would add to those cumulative impacts. As snags are a critical component of LSRs and NSO habitat, replacement is needed. Snag requirements are specifically outlined in the Umpqua NF LMP. Replacement would be immediate though there would be a 10-year delay as snag decay develops. Snag Management is discussed in the NWFP for LSRs on pages C-14 and 15 (USDA FS; USDI BLM 1994b). Snag management levels are based on the Forest's Plant Association Guidelines. .	31.8	Acres
Umpqua NF	Days Creek South Umpqua	Terrestrial Habitat Improvement	Snag Creation	Days Creek South Umpqua Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the pipeline right-of-way. The project prevents development of large snags during the life of the project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres.. Data relies on information from the Cow Creek WA, an adjacent watershed which suggests the watershed is far below historic levels of snag habitat due to past management actions. This project would add to those cumulative impacts. As snags are a critical component of LSRs and NSO habitat, replacement is needed. Snag requirements are specifically outlined in the Forests' LMP. Replacement would be immediate though there would be a 10-year delay as snag decay develops. Snag management levels are based on the Forest's Plant Association Guidelines.	15.7	Acres

TABLE 4-1b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Umpqua NF-Days Creek South Umpqua Watershed	Acres in Watershed	Acres in LSR	Snag Acres
PCGP Corridor Impacts	74.1	31.4	21.2
Hazardous Fuels Reduction	381.8	231.5	
Under-burning	227.0	125.0	
Pre-commercial Thinning	52.8	52.8	
Snag Creation	47.5	31.8	47.5

a/ PCGP Impacts Data Source: 2013 PCGP License Application and USFS GIS files
b/ Offsite Mitigation Actions Data Source: USFS GIS files

Figure 4-1a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Days Creek South Umpqua Watershed

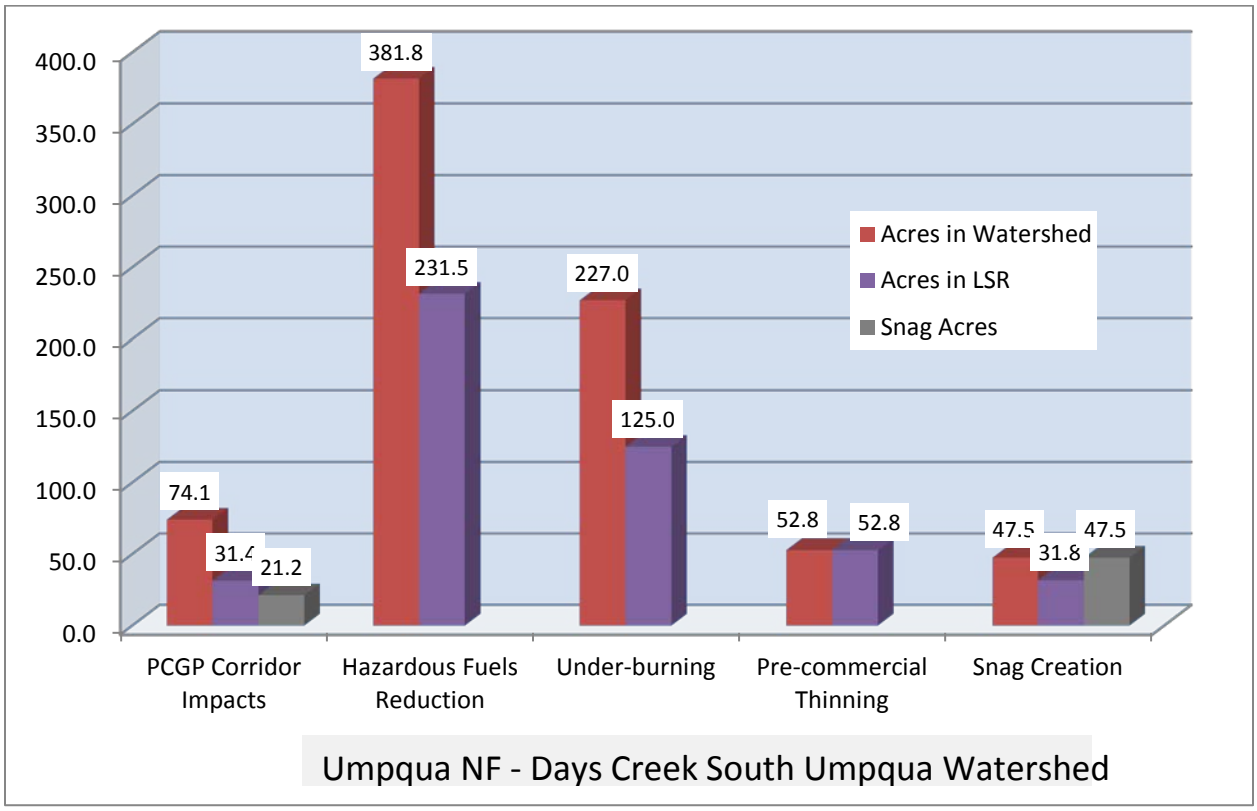


Figure 4-1b. Comparison of PCGP Impacts and Offsite Mitigation Actions within LSR in the Days Creek South Umpqua Watershed

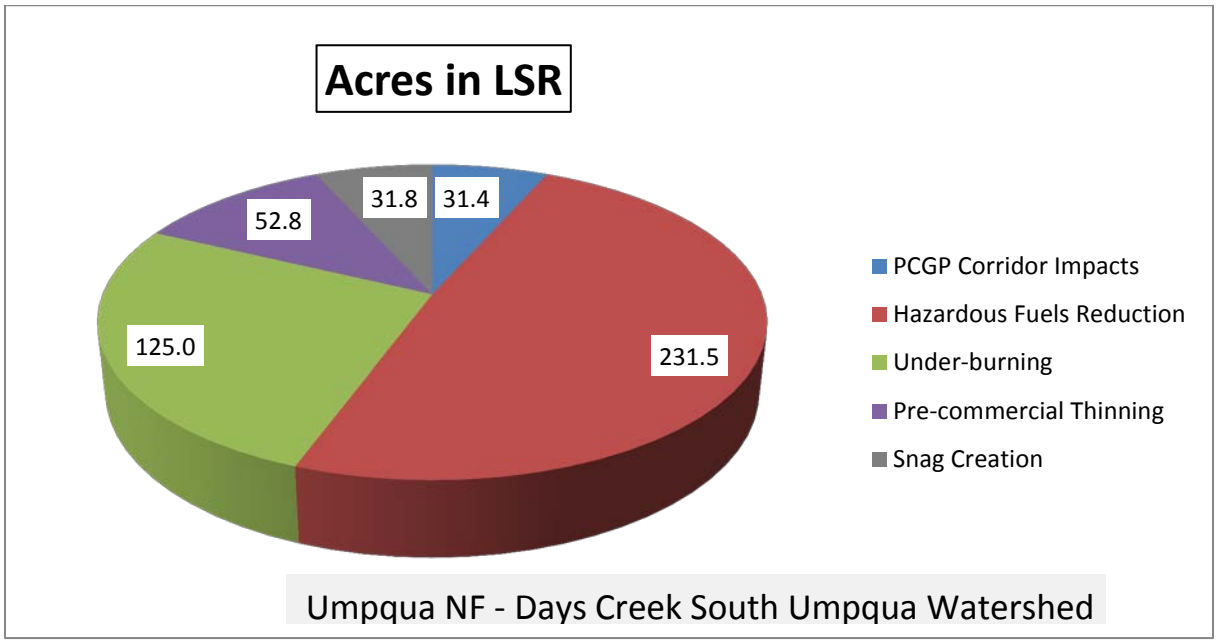


TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Elk Creek South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Elk Creek Fish Passage Culverts	Restoring stream crossings reconnects aquatic habitats in this watershed by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas.	3	Sites
Umpqua NF	Elk Creek South Umpqua	Road sediment reduction	Road Storm-proofing	Elk Creek Road Storm-proofing	Sediment has been identified as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including possible impacts to flow and sediment regimes. Storm-proofing improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	1.6	Miles
Umpqua NF	Elk Creek South Umpqua	Road sediment reduction	Road Closure	Elk Creek Road Close	Close roads and remove culverts and treat weeds Mowing and maintenance of pipeline corridor, temporary road construction, and road use are direct disturbance impacts to wildlife. Road closure would mitigate some of those impacts, improve interior stand connectivity and benefit aquatic habitats over time.	2.8	Miles
Umpqua NF	Elk Creek South Umpqua	Road sediment reduction	Road Decommissioning	Elk Creek Road Decommissioning	A construction corridor 75-95 feet wide with additional work areas would be cleared. Of this, width, a 30-foot wide portion of the corridor would be maintained in early successional habitat. This strip of land, in a forested ecosystem, provides a barrier for movement of small animals between the remaining forest blocks and degrades neighboring habitat through edge effects and fragmentation. This is of special concern in riparian ecosystems where movement of wildlife species is concentrated. Decommissioning and planting selected roads in conjunction with pre-commercial thinning treatments (see other	2.8	Miles

TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					mitigations) would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Removal of culverts and roadbeds in Riparian Reserves reduces sedimentation to the waters. This mitigation meets ACS objectives 2, 4, 5, 8 & 9 (USDA FS; USDI BLM 1994b page C-7). Note that this would be most effective if done in conjunction with the thinning proposed. This mitigation also offsets the impacts of soil compaction and displacement within the Project corridor.		
Umpqua NF	Elk Creek South Umpqua	Stand Density Fuel Break	Fuels Reduction	Elk Creek LSR Integrated fuels	High intensity fire has been identified as the single factor most impacting LSOG forest habitats on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on BLM lands.	896.6	Acres
Umpqua NF	Elk Creek South Umpqua	Stand Density Fuel Break	Fuels Reduction	Elk Creek Matrix Integrated Fuels Reduction	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change.	170.3	Acres

TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the project. The proposed ridge line pipeline route intersects and area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of LSOG habitat. This mitigation provides multiple resources values for the LSR, NFS, adjacent private landowners and public. This segment is part of the Days Creek to Shady Cove fuel break and ties in with similar projects on BLM lands.		
Umpqua NF	Elk Creek South Umpqua	Stand Density Fuel Break	Pre-commercial Thinning	Elk Creek LSR Pre-commercial thinning	There would be direct impacts to existing interior, developing interior habitat. The Project would result in additional fragmentation and preclude the recovery of fragmented habitat for those stands adjacent to the corridor. Maintenance of Project corridor would provide a continued vector for predators, early-seral species and non-native species. Also the Project would result in a direct loss in biological services provided by mature forest characteristics for many decades past the life of the Project. Both mature stands and developing stands would be removed during Project construction. Density management of forested stands would assist in the recovery of late-seral habitat, impact from fragmentation, reduction in edge effects and enhance resilience of mature stands. Accelerating development of mature forest characteristics would shorten the impacts of those biological services loss due to Project construction.	368.3	Acres

TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					Thinning of young stands is a recognized treatment within LRSs if designed to accelerate development of late-successional habitat characteristics (USDA FS; USDI BLM 1994b Pages B-11, C-11, C1-2, and C-17).		
Umpqua NF	Elk Creek South Umpqua	Stand Density Fuel Break	Under-burn	Elk Creek LSR Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the Project. The proposed mitigation is centered on the ecological values associated with LSOG habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable LSOG forest habitat. The proposed ridge line pipeline route intersects an area that has had reoccurring lighting	472	Acres

TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.		
Umpqua NF	Elk Creek South Umpqua	Stand Density Fuel Break	Under-burn	Elk Creek Matrix Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the project. The proposed mitigation is centered on the ecological values associated with late-successional habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable LSOG forest habitat. The proposed ridge line pipeline	115	Acres

TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					route intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.		
Umpqua NF	Elk Creek South Umpqua	Terrestrial Habitat Improvement	LWD Upland Placement	Elk Creek LSR LWD Placement	Mitigate for the loss of recruitment of LWD to adjacent stands and within the Project corridor zone. The Project would forgo the development of LWD for the life of the Project and for decades after. LWD is a critical component of Mature Forest ecosystems. LWD replacement would partially mitigate for the barrier effect of the corridor by creating structure across the corridor for use by small wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID) (Marcot et. al. 2002). Acres that can be treated are necessarily limited by material available from the corridor.	102	Acres
Umpqua NF	Elk Creek South Umpqua	Terrestrial Habitat Improvement	Noxious Weed Treatment	Elk Creek Meadow Noxious Weeds	Mitigate impacts to unique habitats (e.g., meadows) impacted by the Project. There would be loss of forest habitat buffering the unique habitats and disruption to soil horizons enhancing the opportunities for non-native plant species.	105.5	Acres
Umpqua NF	Elk Creek South Umpqua	Terrestrial Habitat Improvement	Noxious Weed Treatment	Elk Creek Roadside Noxious Weeds	Mitigate impacts to unique habitats (e.g., meadows) impacted by the Project. There would be loss of forest habitat buffering the unique habitats and disruption to soil horizons enhancing the opportunities for non-native plant species.	6.7	Miles
Umpqua	Elk Creek	Terrestrial	Snag Creation	Elk Creek LSR	Mitigate immediate and future	66.3	Acres

TABLE 4-2a

Mitigation Actions Proposed in the Elk Creek South Umpqua Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
NF	South Umpqua	Habitat Improvement		Snag Creation	impacts to snag habitat from the clearing of the Project corridor. The Project prevents development of large snags during the life of the Project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres. Data relies on the Cow Creek WA prepared for an adjacent watershed which suggests the watershed is far below historic levels of snag habitat due to past management actions. This project would add to those cumulative impacts. As snags are a critical component of LSR and NSO habitat, replacement is needed. Snag requirements are specifically outlined in the Forests' LMP. Replacement would be immediate though there would be a 10-year delay as snag decay develops. Snag Management is discussed in the NWFP for LSRs on pages C-14 and 15 (USDA FS; USDI BLM 1994b). Snag management levels are based on the Forest's Plant Association Guidelines.		
Umpqua NF	Elk Creek South Umpqua	Terrestrial Habitat Improvement	Snag Creation	Elk Creek Matrix Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the Project corridor. The project prevents development of large snags during the life of the Project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres of Project. This project would add to those cumulative impacts. Snag requirements are specifically outlined in the Umpqua NF LMP. Replacement would be immediate though there would be a 10 year delay as snag decay develops. Snag management levels are based on the Forest's Plant Association Guidelines.	13.2	Acres

TABLE 4-2b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Umpqua NF-Elk Creek South Umpqua Watershed	Acres in Watershed	Acres in LSR	Snag Acres
PCGP Corridor Impacts	32.5	21.5	32.5
Hazardous Fuels Reduction	1066.9	896.6	
Under-burning	587.0	472.0	
Road Decommissioning	17.0		
LWD Placement	102.0	102.0	
Pre-commercial Thinning	368.3	368.3	
Sang Creation	69.5	66.3	69.5

a/ PCGP Impacts Data Source: 2013 PCGP License Application and USFS GIS files
b/ Offsite Mitigation Actions Data Source: USFS GIS files

Figure 4-2a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Elk Creek South Umpqua Watershed

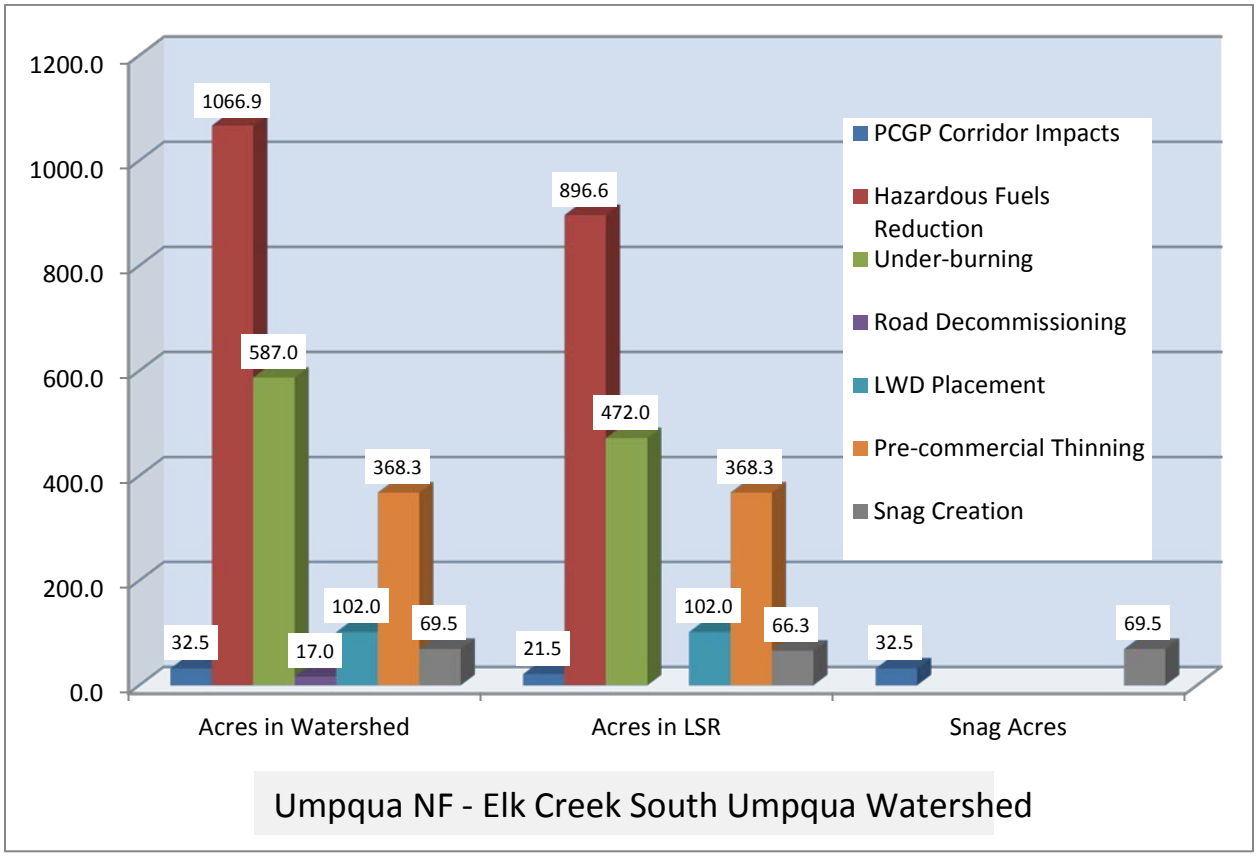


Figure 4-2b. Comparison of PCGP Impacts and Offsite Mitigation Actions within LSR in the Elk Creek South Umpqua Watershed

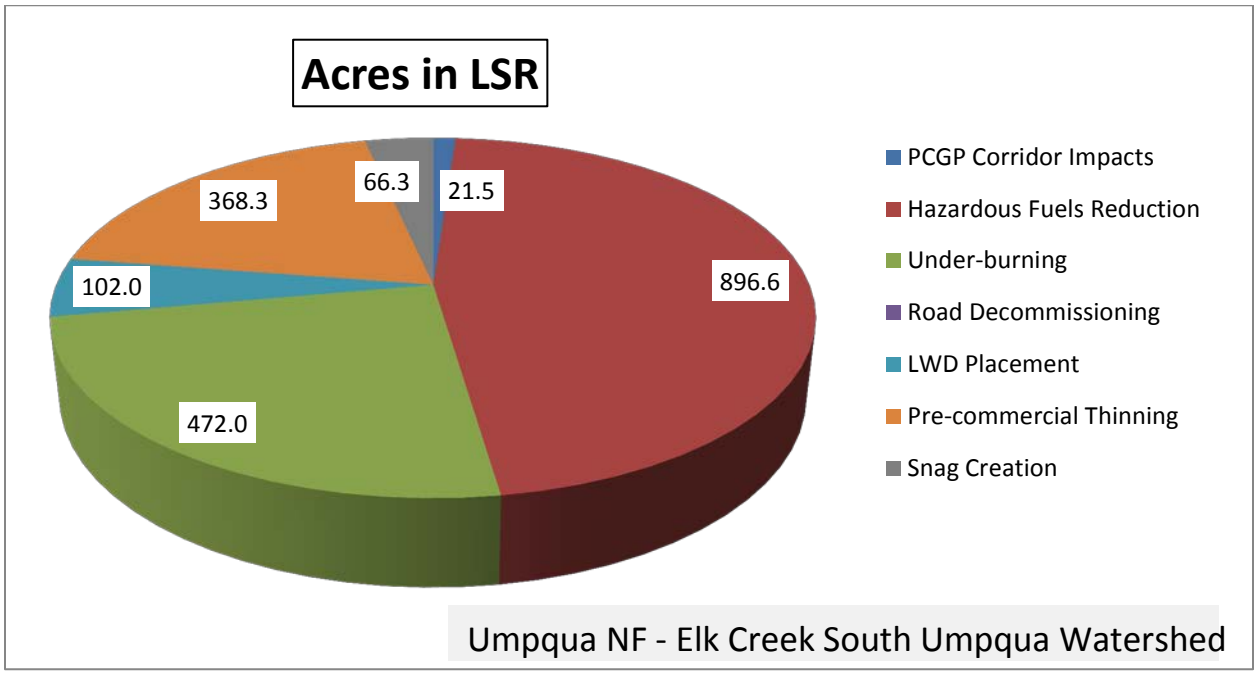


TABLE 4-3a

Mitigation Actions Proposed in the Upper Cow Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Upper Cow Creek	Aquatic and Riparian Habitat	Fish Passage	Upper Cow Creek Fish Passage Culverts	Restoring stream crossings in this watershed reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting intended to offset Project impacts associated with shade removal.	4	Site
Umpqua NF	Upper Cow Creek	Road sediment reduction	Road Closure	Upper Cow Creek Road Closure	Close roads, remove culverts, and treat weeds Mowing and maintenance of Project corridor, temporary road construction, and road use are direct disturbance impacts to wildlife. Road closure would mitigate some of those impacts, improve interior stand connectivity and benefit aquatic habitats over time.	2.6	Miles
Umpqua NF	Upper Cow Creek	Road sediment reduction	Road Decommissioning	Upper Cow Creek Road Decommissioning	A construction corridor 75-95 wide with additional work areas would be cleared. Of this, a 30-foot wide route along the corridor would be maintained in early successional habitat. This strip of land, in a forested ecosystem, provides a barrier for movement of small animals between the remaining forest blocks and degrades neighboring habitat through edge effects and fragmentation. This is of special concern in riparian ecosystems where movement of wildlife species is concentrated. Decommissioning and planting selected roads in conjunction with pre-commercial thinning treatments (see other mitigation actions) would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Removal of culverts and roadbeds in Riparian Reserves sedimentation to the waters. This mitigation meets ACS objectives 2, 4, 5, 8 & 9 (USDA FS; USDI BLM 1994b page C-7). Note that this would be most effective if done in conjunction with the thinning proposed. This mitigation also offsets the impacts of soil compaction and displacement	4.3	Miles

TABLE 4-3a

Mitigation Actions Proposed in the Upper Cow Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					within the pipeline corridor.		
Umpqua NF	Upper Cow Creek	Stand Density Fuel Break	Fuels Reduction	Upper Cow Creek LSR Integrated Fuels Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on BLM lands.	971.9	Acres
Umpqua NF	Upper Cow Creek	Stand Density Fuel Break	Fuels Reduction	Upper Cow Creek Matrix Integrated Fuels Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on BLM lands.	606.1	Acres
Umpqua NF	Upper Cow Creek	Stand Density Fuel Break	Under-burn	Upper Cow Creek LSR Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would	531	Acres

TABLE 4-3a

Mitigation Actions Proposed in the Upper Cow Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the Project. The proposed mitigation is centered on the ecological values associated with late-successional habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable LSOG habitat. The proposed ridge line pipeline route intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of the LSOG habitat forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.		
Umpqua NF	Upper Cow Creek	Stand Density Fuel Break	Under-burn	Upper Cow Creek Matrix Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire.	410	Acres

TABLE 4-3a

Mitigation Actions Proposed in the Upper Cow Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the project. The proposed mitigation is centered on the ecological values associated with late-successional habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable LSOG habitat. The proposed ridge line pipeline route intersects and area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.		
Umpqua NF	Upper Cow Creek	Terrestrial Habitat Improvement	LWD Upland Placement	Upper Cow Creek LSR LWD Placement	Mitigate for the loss of recruitment of LWD to adjacent stands and within the Project corridor. The Project would forgo the development of LWD for the life of the Project and for decades after. LWD is a critical component of Mature Forest ecosystems. Replacement of	61.6	Acres

TABLE 4-3a

Mitigation Actions Proposed in the Upper Cow Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					LWD would partially mitigate for the barrier effect of the corridor by creating structure across the corridor for use by small wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID) (Marcot et. al. 2002). Acres that can be treated are necessarily limited by material available from the corridor.		
Umpqua NF	Upper Cow Creek	Terrestrial Habitat Improvement	Noxious Weed Treatment	Upper Cow Creek Meadow Noxious Weeds	Mitigate impacts to unique habitats (e.g., meadows) impacted by the Project. There would be loss of forest habitat buffering the unique habitats and disruption to soil horizons enhancing the opportunities for non-native plant species.	21.3	Acres
Umpqua NF	Upper Cow Creek	Terrestrial Habitat Improvement	Snag Creation	Upper Cow Creek LSR Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the Project corridor. The Project prevents development of large snags during the life of the Project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres. Data relies on the Cow Creek WA which suggests this watershed is far below historic levels of snag habitat due of past management actions. This Project would add to those cumulative impacts. As snags are a critical component of LSRs and NSO habitat, replacement is needed. Snag requirements are specifically outlined in the Umpqua NF LMP. Replacement would be immediate though there would be a 10 year delay as snag decay develops. Snag Management is discussed in the NWFP for LSRs on pages C-14 and 15 (USDA FS; USDI BLM 1994b). Snag management levels are based	91.1	Acres

TABLE 4-3a

Mitigation Actions Proposed in the Upper Cow Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					on the Forest's Plant Association Guidelines.		
Umpqua NF	Upper Cow Creek	Terrestrial Habitat Improvement	Snag Creation	Upper Cow Creek Matrix Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the Project corridor. The Project prevents development of large snags during the life of the project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres. Data relies on the Cow Creek WA which suggests this watershed is far below historic levels of snag habitat due of past management actions. This Project would add to those cumulative impacts. Snag requirements are specifically outlined in the Umpqua NF LMP. Replacement would be immediate though there would be a 10 year delay as snag decay develops. Snag management levels are based on the Forest's Plant Association Guidelines.	13.8	Acres
Umpqua NF	Upper Cow Creek	Reallocation of Matrix Lands to LSR	Reallocation of Matrix to LSR	LSR 223 Addition	This action contributes to the "neutral to beneficial" standard for new developments in LSRs by adding acres to the LSR land allocation to offset the long-term loss of acres of habitat from the construction and operation of the Project.	588	Acres

TABLE 4-3b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Umpqua NF Upper Cow Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves
PCGP Corridor	4.4	75.5	38.6	10.7
Road Decommissioning	4.3	10.4	1.9	0.2
Road Closures	2.6	6.3	0.5	0.7
Hazardous Fuels Reduction		1578.0	971.9	235.6
Under-burning		941.0	531.0	140.5
LWD Placement		61.6	61.6	4.9
Snag Creation		104.9	91.1	0.0

a/ PCGP Impacts Data Source: 2013 PCGP License Application and USFS GIS files
b/ Offsite Mitigation Actions Data Source: USFS GIS files
Note: Road Decommissioning/closure acres based on a 20' wide treatment area
Under-burning acres in in Riparian Reserves is an estimate

Figure 4-3a. Comparison of PCGP Impacts and Offsite Aquatic Mitigation Actions in the Upper Cow Creek Watershed

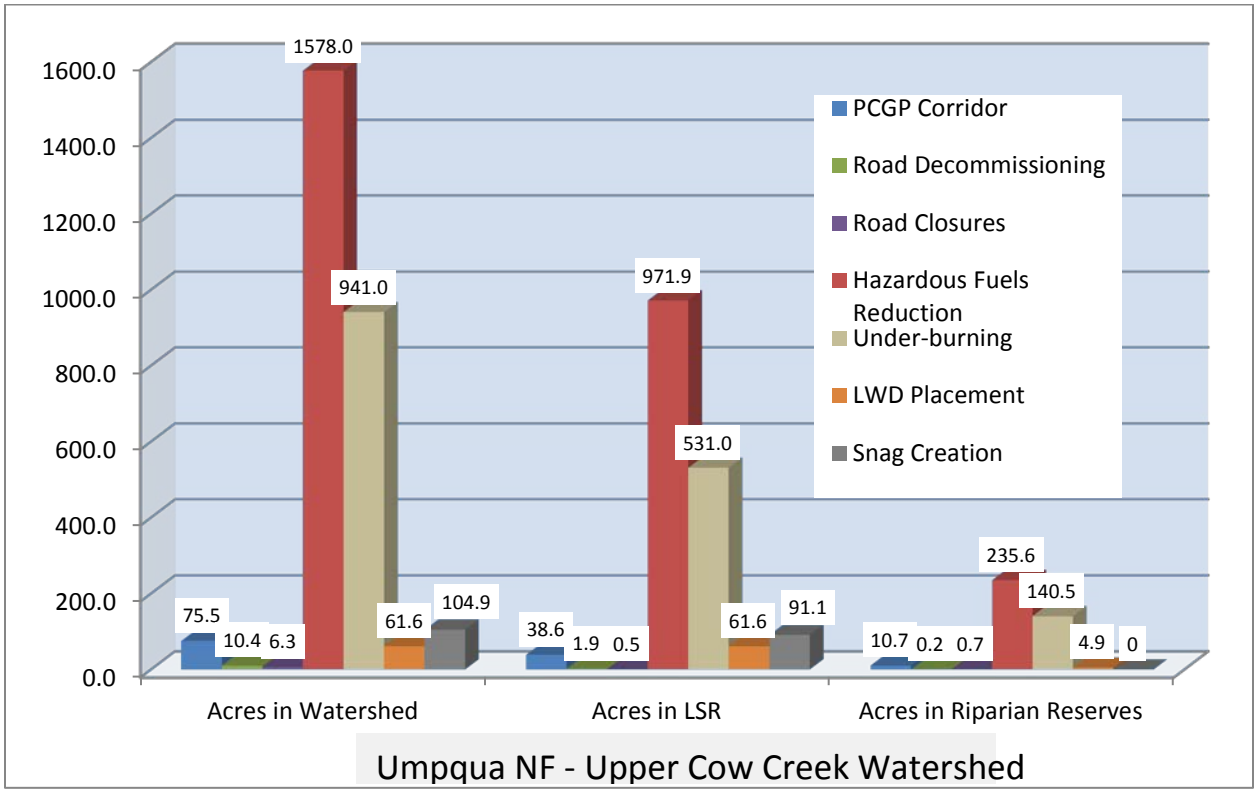


Figure 4-3b. Comparison of PCGP Impacts and Offsite Mitigation Actions within LSR in the Upper Cow Creek Watershed

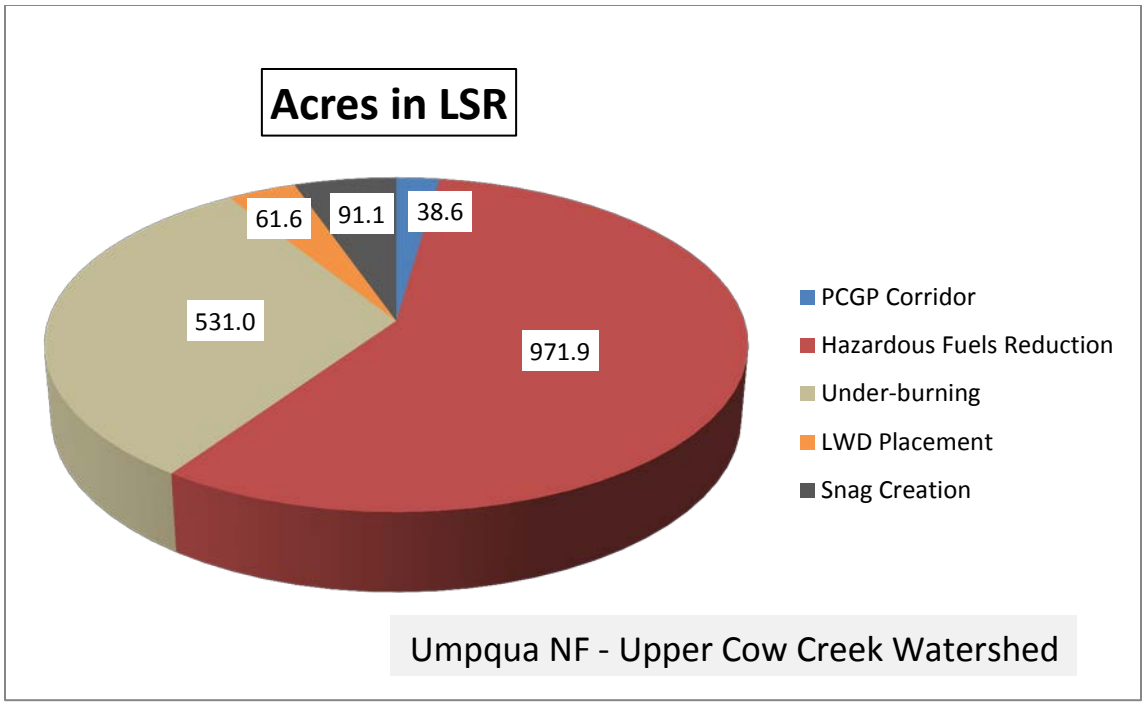


Figure 4-3c. Comparison of PCGP Impacts and Offsite Mitigation Actions within Riparian Reserves in the Upper Cow Creek Watershed

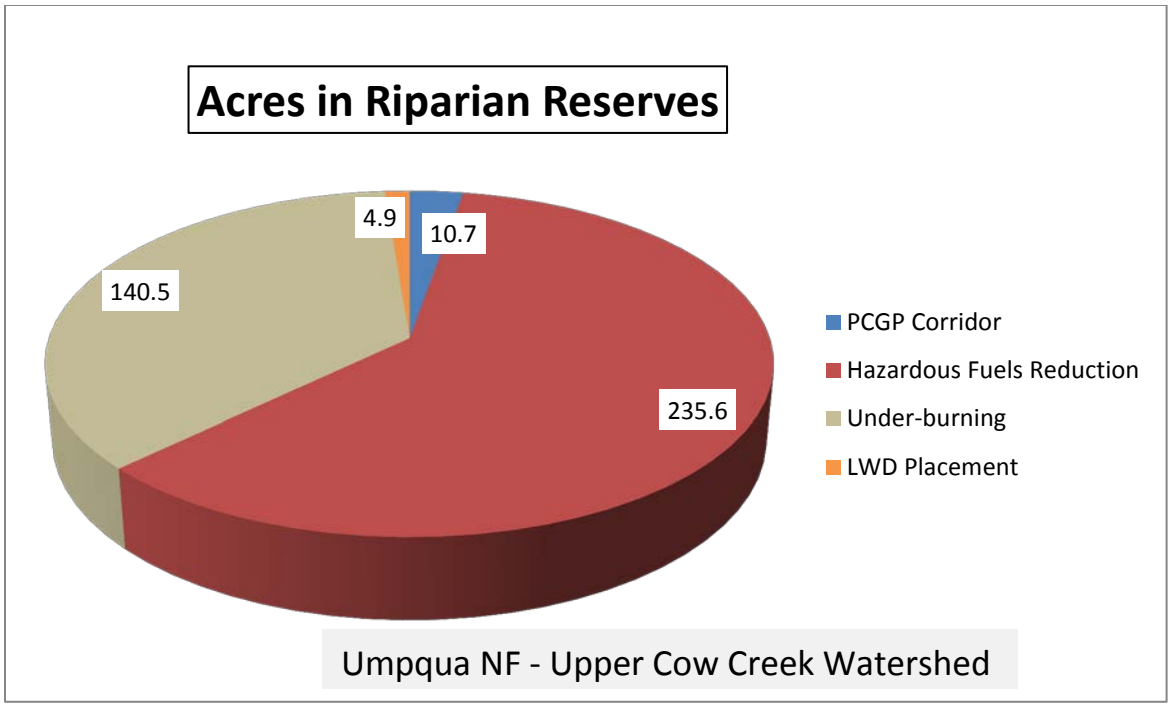


TABLE 4-4a

Mitigation Actions Proposed in the Trail Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Umpqua NF	Trail Creek	Road sediment reduction	Road Decommissioning	Trail Creek Road Decommissioning	A construction corridor 75-95 wide with additional work areas would be cleared. Of this, a 30-foot wide route along the Project corridor would be maintained in early successional habitat. This strip of land, in a forested ecosystem, provides a barrier for movement of small animals between the remaining forest blocks and degrades neighboring habitat through edge effects and fragmentation. This is of special concern in riparian ecosystems where movement of wildlife species is concentrated. Decommissioning and planting selected roads in conjunction with pre commercial thinning treatments (see other mitigations) would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Removal of culverts and roadbeds in riparian reduces sedimentation to the waters. This mitigation meets ACS objectives 2, 4, 5, 8 & 9 (USDA FS; USDI BLM 1994b page C-7). Note that this would be most effective if done in conjunction with the thinning proposed. This mitigation also offsets the impacts of soil compaction and displacement within the construction corridor.	1.1	Miles
Umpqua NF	Trail Creek	Road sediment reduction	Road Storm-proofing	Trail Creek Storm-proofing	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in this watershed. The effects of the Project are similar to a road, including possible impacts to flow and sediment regimes. Storm-proofing improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	0.5	Miles
Umpqua NF	Trail Creek	Stand Density Fuel Break	Fuels Reduction	Trail Creek Matrix Integrated Fuels Reduction	High intensity fire has been identified as the single factor most impacting LSOG forest habitat on federal lands in the area of the NWFP. Construction of the Project removes both mature and developing stands and would	414.2	Acres

TABLE 4-4a

Mitigation Actions Proposed in the Trail Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					increase fire suppression complexity however the corridor also provides a fuel break. Fuels reduction adjacent to the corridor would increase the effectiveness of the corridor as a fuel break. Fuels reduction would lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on BLM lands.		
Umpqua NF	Trail Creek	Stand Density Fuel Break	Under-burn	Trail Creek Matrix Under-burn	Both mature stands and developing stands would be removed during Project construction. Impacts to mature and developing stands would exceed the life of this Project by many decades. Density management would increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands would accelerate development of LSOG habitat . Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG habitat is essentially a permanent loss that cannot be replaced. Young stands would take 70 years to develop into LSOG habitat so this is not a 1-1 replacement. LSRAs have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to be treated so habitat over time becomes contiguous and is in proximity of the project. The proposed mitigation is centered on the ecological values associated with LSOG habitat. The values to associated species, many other ecosystem goods and services components such as micro-organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to	280	Acres

TABLE 4-4a

Mitigation Actions Proposed in the Trail Creek Watershed on the Umpqua NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					establish appropriate level of mitigation for the loss of irreplaceable LSOG habitat. The proposed ridge line pipeline route intersects and area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation would assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, NFS lands, adjacent private landowners and public.		
Umpqua NF	Trail Creek	Terrestrial Habitat Improvement	Snag Creation	Trail Creek Matrix Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the Project corridor. The Project prevents development of large snags during the life of the Project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres. This project would add to those cumulative impacts. As snags are a critical component of LSRs and NSO habitat, replacement is needed. Snag requirements are specifically outlined in the Rogue River NF LMP. Replacement would be immediate though there would be a 10 year delay as snag decay develops. Snag Management is discussed in the NWFP for LSRs on pages C-14 and 15 (USDA FS; USDI BLM 1994b). Snag management levels are based on the Forest's Plant Association Guidelines.	108.6	Acres

TABLE 4-4b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Umpqua NF-Trail Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in Riparian Reserves	Acres in LSR
PCGP Corridor Impacts	2.1	50.2	0.0	0.0
Hazardous Fuels Reduction		414.2	148.0	0.0
Snag Creation		108.6	0.0	0.0
Road Sediment Reduction	1.6	3.9	0.2	0.0

a/ PCGP Impacts Data Source: 2013 PCGP License Application and USFS GIS files
b/ Offsite Mitigation Actions Data Source: USFS GIS files
Note: Road Sediment Reduction acres based on an estimate of a 20' wide treatment area

Figure 4-4. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Trail Creek watershed

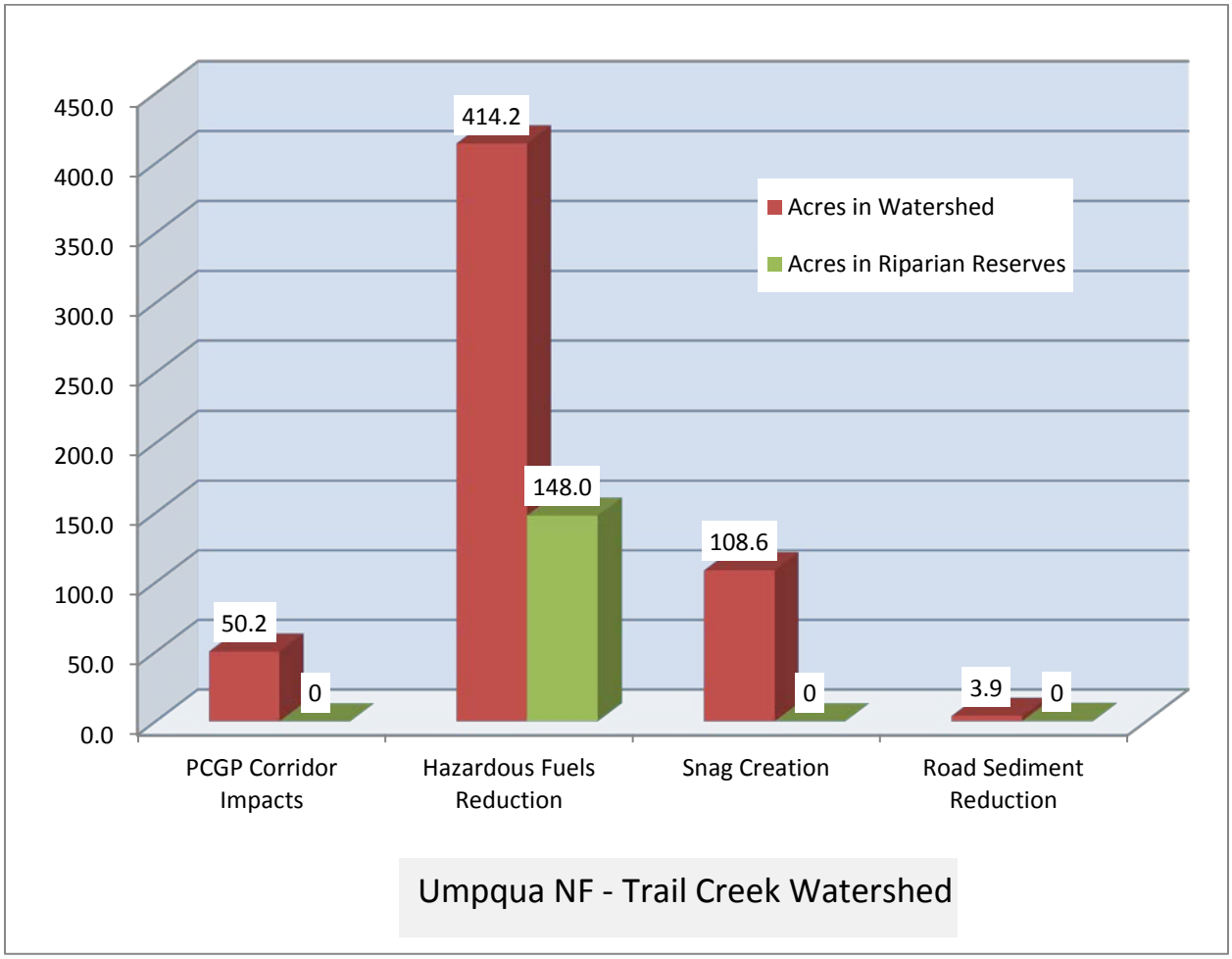


TABLE 4-5

Mitigation Actions Proposed in the Big Butte Creek Watershed on the Rogue River NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
RRNF	Big Butte Creek	Reallocation of Matrix Lands to LSR	Reallocation of Matrix to LSR	LSR 227 Addition	This action contributes to the "neutral to beneficial" standard for new developments in LSRs by adding acres to the LSR land allocation to offset the long-term loss of acres of acres and habitat from the construction and operation of the Project.	512	Acres

TABLE 4-6a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the Rogue River NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Rogue River NF	Little Butte Creek	Aquatic and Riparian Habitat	LWD In-stream	SF Little Butte Creek LWD	Over the last century, many streams with high aquatic habitat potential have become simplified, and therefore, have a reduced capacity to provide quality habitat. Riparian stands have decreased health and vigor, resulting in increased time to develop large tree structure for wildlife, stream shade, and future in-stream LWD. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time.	1.5	Mile
Rogue River NF	Little Butte Creek	Aquatic and Riparian Habitat	Stream Crossing Repair	Little Butte Creek Stream Crossing Decommissioning	Restoring stream crossings in this watershed reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting intended to offset Project impacts associated with shade removal.	32	Sites
Rogue River NF	Little Butte Creek	Road sediment reduction	Road Decommissioning	Little Butte Creek Road Decommissioning	A construction corridor 75-95 wide with additional work areas would be cleared. Of this, a 30-foot wide route along the Project corridor would be maintained in early successional habitat. This strip of land, in a forested ecosystem, provides a barrier for movement of small animals between the remaining forest blocks and degrades neighboring habitat through edge effects and fragmentation.	53.2	Miles

TABLE 4-6a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the Rogue River NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					This is of special concern in riparian ecosystems where movement of wildlife species is concentrated. Decommissioning and planting selected roads in conjunction with pre-commercial thinning treatments (see other mitigations) would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Removal of culverts and roadbeds in Riparian Reserves reduces sedimentation to the waters. This mitigation meets ACS objectives 2, 4, 5, 8 & 9. The Little Butte Creek watershed is a Key Watershed and road reduction is a major objective (USDA FS; USDI BLM 1994b page C-7). Note that this would be most effective if done in conjunction with the thinning proposed. This mitigation also offsets the impacts of soil compaction and displacement within the construction corridor.		
Rogue River NF	Little Butte Creek	Stand Density Fuel Break	Pre-commercial Thinning	Little Butte Cr LSR Pre-commercial Thin	There would be direct impacts to existing interior, developing interior habitat. The Project would result in additional fragmentation and preclude the recovery of fragmented habitat for those stands adjacent to the pipeline corridor. Maintenance of Project corridor would provide a continued vector for predators, early-seral species and non-native species. Also the Project would result in a direct loss in biological services provided by mature forest characteristics for many decades past the life of this project. Both mature stands and developing stands would be removed during Project construction. Density management of forested stands would assist in the recovery of late-seral habitat, impact from fragmentation, reduction in edge effects and enhance resilience of mature stands. Accelerating development of mature forest characteristics would shorten the impacts of those biological services loss due to Project construction. Thinning of young stands is a recognized	617.8	Acres

TABLE 4-6a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the Rogue River NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					treatment within LRSs if designed to accelerate development of late-successional habitat characteristics (USDA FS; USDI BLM 1994b Pages B-11, C-11, C1-2, and C-17).		
Rogue River NF	Little Butte Creek	Terrestrial Habitat Improvement	Habitat Planting	Little Butte Creek Mardon Skipper Butterfly	The Dead Indian Plateau region is one of three known sites for Mardon Skipper butterflies in the world. This region also encompasses a known site for Short-horned Grasshoppers. Both species are on the Forest's Sensitive Species list. The Project would require a permanent open corridor that provides a unique opportunity to develop habitat for these skippers and grasshoppers. Planting the corridor with plants preferred by these Sensitive Species has the potential to increase the habitat and local range for these two species. Rehabilitation of disturbed sites is required under various BMP guidelines. Use of specific plant species has no additional problems. Results would be immediate in stabilizing the local habitat.	20	Acres
Rogue River NF	Little Butte Creek	Terrestrial Habitat Improvement	LWD Upland Placement	Little Butte Creek LSR LWD Placement	Mitigate for the loss of recruitment of LWD to adjacent stands and within the Project corridor. The Project would forgo the development of LWD for the life of the Project and for decades after. LWD is a critical component of Mature Forest ecosystems. Replacement of LWD would partially mitigate for the barrier effect of the corridor by creating structure across the corridor for use by small wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID) (Marcot et. al. 2002). Acres that can be treated are necessarily limited	306	Acres

TABLE 4-6a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the Rogue River NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					by material available from the corridor.		
Rogue River NF	Little Butte Creek	Terrestrial Habitat Improvement	Snag Creation	Little Butte Creek LSR Snag Creation	Mitigate immediate and future impacts to snag habitat from the clearing of the Project corridor. The Project prevents development of large snags during the life of the project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres. This project would add to those cumulative impacts. As snags are a critical component of LSRs and NSO habitat, replacement is needed. Snag requirements are specifically outlined in the Rogue River NF LMP. There would be a 10 year delay as snag decay develops. Snag management is required in the Forests' LMP (4-20), with levels set under the various management directions. Snag Management is discussed in the NWFP for LSRs on pages C-14 and 15 (USDA FS; USDI BLM 1994b). Snag management levels are based on the Forest's Plant Association Guidelines. Snags are also discussed in the South Cascades LSRA, chapter 3 (USDA FS; USDI BLM 1998a).	622	Acres
Rogue River NF	Little Butte Creek	Reallocation of Matrix Lands to LSR	Reallocation of Matrix to LSR	LSR 227 Addition	This action contributes to the "neutral to beneficial" standard for new developments in LSRs by adding acres to the LSR land allocation to offset the long-term loss of acres of acres and habitat from the construction and operation of the Project.	12	Acres

TABLE 4-6b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Rogue River NF-Little Butte Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves
PCGP Corridor Impacts	13.7	279.5	279.5	8.7
LWD In-stream	1.5	9.1	9.1	9.1
Road Decommissioning	53.2	129.0	129.0	9.4
Pre-commercial Thinning		617.8	617.8	59.0
LWD Placement		306.0	306.0	7.1
Snag Creation		622.0	622.0	89.7

a/ PCGP Impacts Data Source: 2013 PCGP License Application and USFS GIS files
b/ Offsite Mitigation Actions Data Source: USFS GIS files
Note: LWD In-stream acres based on an estimate of a 50' wide treatment area
Road Decommissioning acres based on as estimate of a 20' wide treatment area

Figure 4-6a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Little Butte Creek Watershed

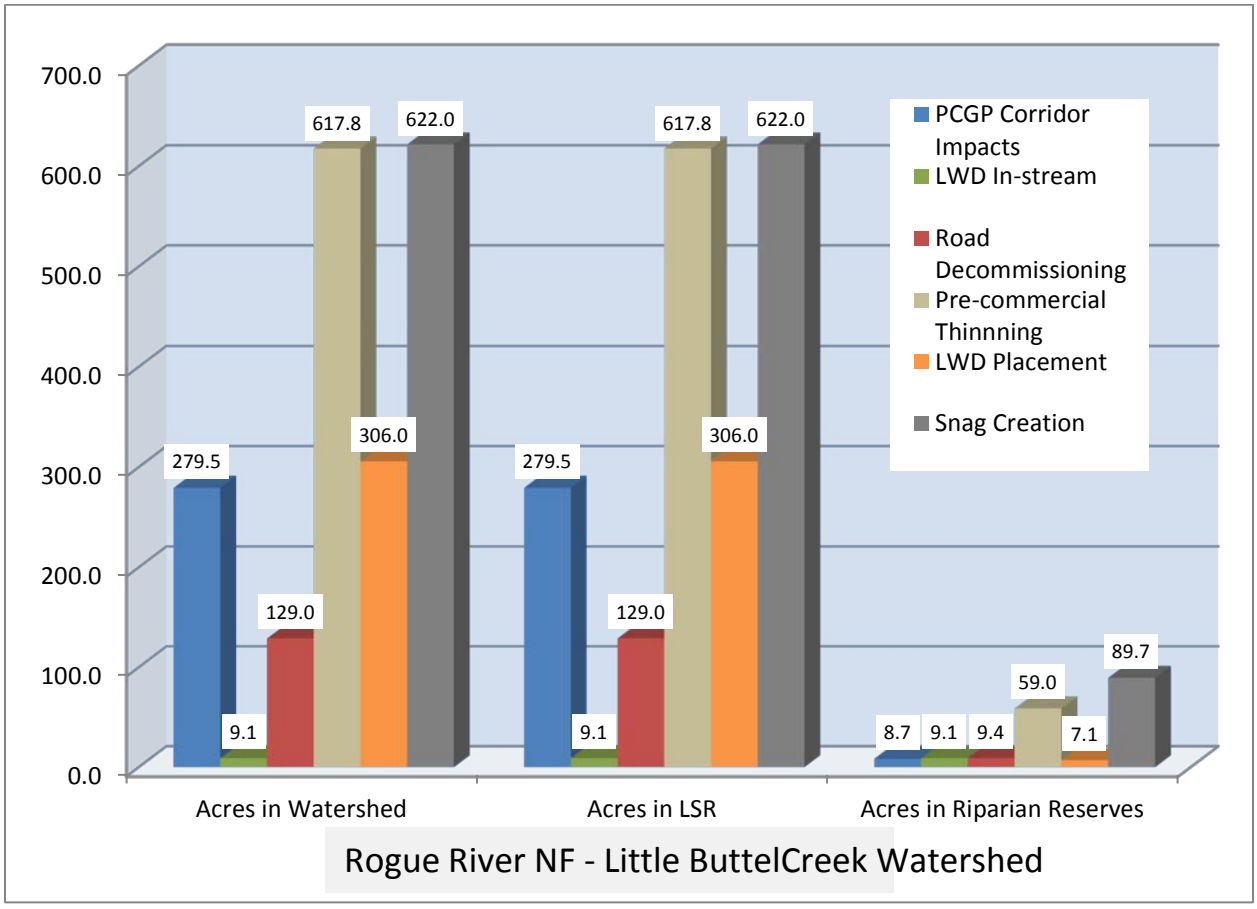


Figure 4-6b. Comparison of PCGP Impacts and Offsite Mitigation Actions in LSR within the Little Butte Creek Watershed

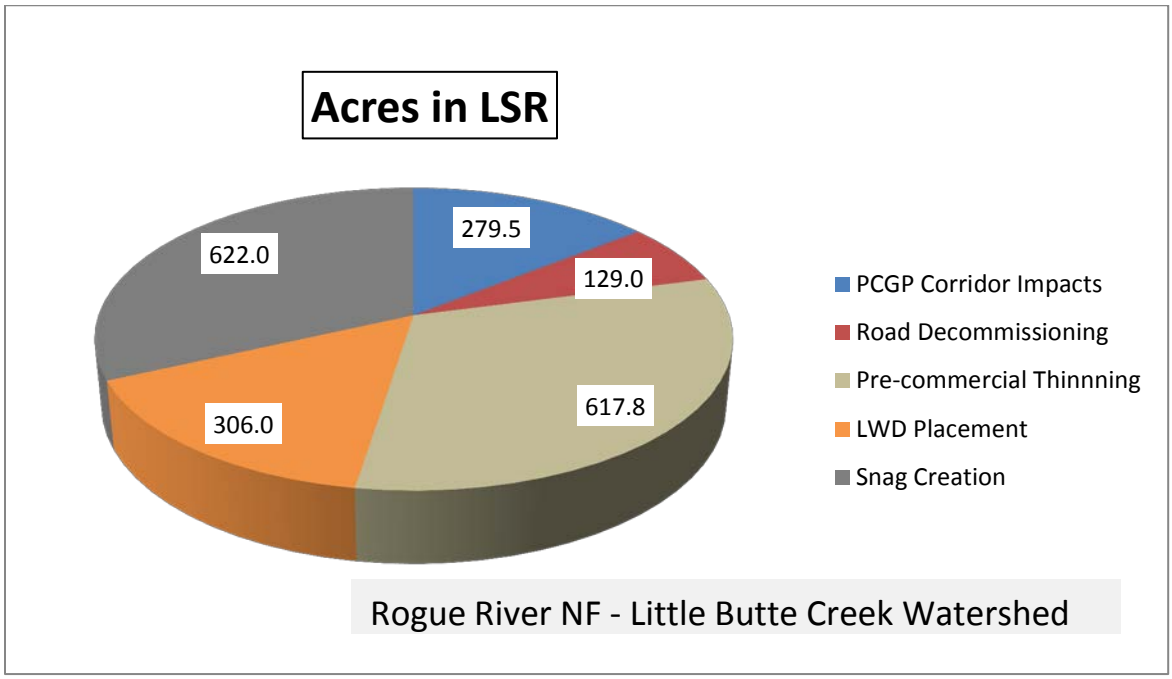


Figure 4-6c. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves within the Little Butte Creek Watershed

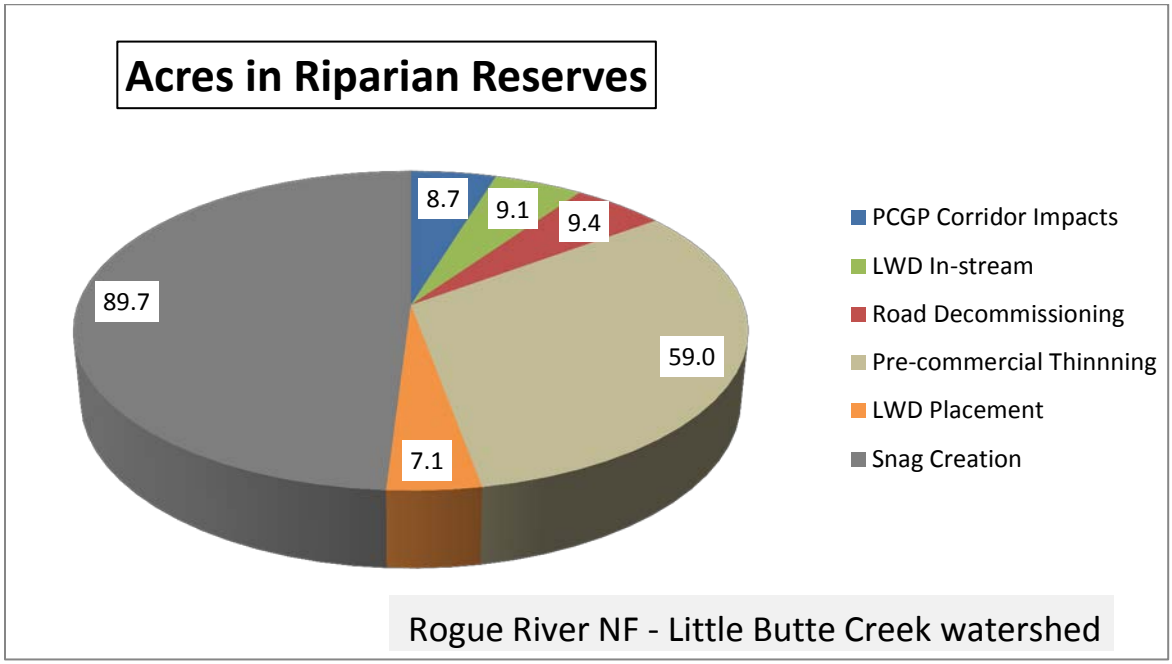


TABLE 4-7a

Mitigation Actions Proposed in the Spencer Creek Watershed on the Winema NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
Winema NF	Spencer Creek	Aquatic and Riparian Habitat	Riparian Planting	Spencer Creek Riparian Planting	This action is directed at the reach of Spencer Creek just upstream of Buck Lake. This is a meadow site that has lost streamside vegetation and has compacted soils. There is an overall need to restore health and vigor to riparian stands by maintaining and improving Riparian Reserves and associated riparian and aquatic habitat. Shade provided by the plantings would contribute to moderating water temperatures in Spencer Creek. Root strength provided by new vegetation would increase bank stability, decrease erosion and sediment depositions to Spencer Creek and provide habitat for species that use riparian habitats.	0.5	Mile
Winema NF	Spencer Creek	Aquatic and Riparian Habitat	Fencing	Spencer Creek Fencing	This fence would serve to divide the Buck Indian Allotment into two pastures on either side of Clover Creek Road. This fence would keep cattle from grazing newly re-vegetated areas in the Project corridor, including areas where the corridor crosses Spencer Creek, thus helping to ensure that erosion control and re-vegetation objectives are met. It would also serve to separate anticipated increased cattle grazing of the corridor from the road; greatly reducing a safety hazard for vehicles traveling the Clover Creek Road. This fence would require 7-9 cattle guard crossings for Forest Roads intersecting the fence	6.4	Miles
Winema NF	Spencer Creek	Aquatic and Riparian Habitat	LWD In-stream	Spencer Creek In-stream LWD	Over the last century, many streams with high aquatic habitat potential have become simplified, and therefore, have a reduced capacity to provide quality habitat. Riparian stands have decreased health and vigor, resulting in increased time to develop large tree structure for wildlife, stream shade, and future in-stream wood. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. The BLM completed placement of LWD on 3 miles of Spencer Creek below this reach in 2013.	1.0	Mile

TABLE 4-7a

Mitigation Actions Proposed in the Spencer Creek Watershed on the Winema NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					Addition of this segment of Spencer Creek would complete the stream rehabilitation on the reach of Spencer Creek that would be affected by the Project. Logs from the Project corridor would be used for the project. An estimated 75 pieces of LWD are needed. A helicopter would be used to place the logs.		
Winema NF	Spencer Creek	Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Ford Hardening and Interpretive Sign	The Project corridor would cross Spencer Creek upstream of Buck Lake. This crossing is at the uppermost reach of the perennial portion of Spencer Creek which is occupied by redband trout, a sensitive species. Both NMFS and ODF&W recognize that Spencer Creek provided historical habitat for Federally listed Southern Oregon/Northern California Coast Coho salmon. Additionally, in the event that fish passage is reestablished as part of the FERC relicensing process for the Klamath River hydropower project, steelhead are expected to re-colonize Spencer Creek. Improving habitat quality by hardening an existing low-water ford across Spencer Creek provides the opportunity to be pro-active in providing quality habitat for SONC Coho, mitigating for any detrimental effects to other SONC Coho habitats, while improving habitat for redband trout and other aquatic species. Spencer Creek appears on the Oregon DEQ 303(d) list as water quality impaired from increased sedimentation. Improvements at this location would immediately benefit all downstream aquatic habitats and the species associated with those habitats. This includes interpretive signage.	1	Site
Winema NF	Spencer Creek	Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Stream Crossing Decommissioning	Removing and/or decommissioning stream crossings in this watershed reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting intended to offset Project	25	Sites

TABLE 4-7a

Mitigation Actions Proposed in the Spencer Creek Watershed on the Winema NF

Admin Unit	Watershed	Mitigation Group	Project Type	Project Name	Project Rationale	Quantity	Unit
					impacts associated with shade removal.		
Winema NF	Spencer Creek	Road sediment reduction	Road Decommissioning	Spencer Creek Road Decommissioning	A construction corridor 75-95 wide with additional work areas would be cleared. Of this, a 30-foot wide route along the pipeline route would be maintained in early successional habitat. This strip of land, in a forested ecosystem, provides a barrier for movement of small animals between the remaining forest blocks and degrades neighboring habitat through edge effects and fragmentation. This is of special concern in riparian ecosystems where movement of wildlife species is concentrated. Decommissioning and planting selected roads in conjunction with pre-commercial thinning treatments (see other mitigations) would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Removal of culverts and roadbeds in riparian reduces sedimentation to the waters. This mitigation meets ACS objectives 2, 4, 5, 8 & 9 (USDA FS; USDI BLM 1994b page C-7). Note that this would be most effective if done in conjunction with the thinning proposed. This mitigation also offsets the impacts of soil compaction and displacement within the Project corridor.	21.4	Miles
Winema NF	Spencer Creek	Visuals	Stand Density Reduction	Clover Creek Visual Mgt.	The Project corridor would create a hard line along the timbered edge of the corridor that does not fit with the visual objectives for the Clover Creek Road or the Dead Indian Memorial Highway. Thinning and fuels treatments can be used to soften the edge to a more natural appearing texture by restoring stand density to more natural levels and creating small openings that are consistent with landscape. Thinning of commercial sized material may be accomplished with a commercial timber sale. The mitigation is intended to supplement funding for the non-commercial part of that work for visual purposes that could not otherwise be accomplished.	113.5	Acres

TABLE 4-7b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Winema NF-Spencer Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian Reserves	Stream Intersects
PCGP Corridor Impacts	6.1	92.8	0.0	7.0	5.0
LWD In-stream	1.0	6.0	0.0	6.0	
Road Decommissioning	21.4	52.0	23.5	7.5	25.0
Riparian Planting	0.5	3.0	0.0	3.0	

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM GIS files
b/ Offsite Mitigation Actions Data Source: BLM GIS files
Notes: Road Decommissioning acres based on an estimate of a 20' wide treatment area
LWD In-stream acres based on an estimate of a 50' wide treatment area

Figure 4-7a. Comparison of PCGP Impacts and Offsite Mitigation Actions in the Spencer Creek Watershed

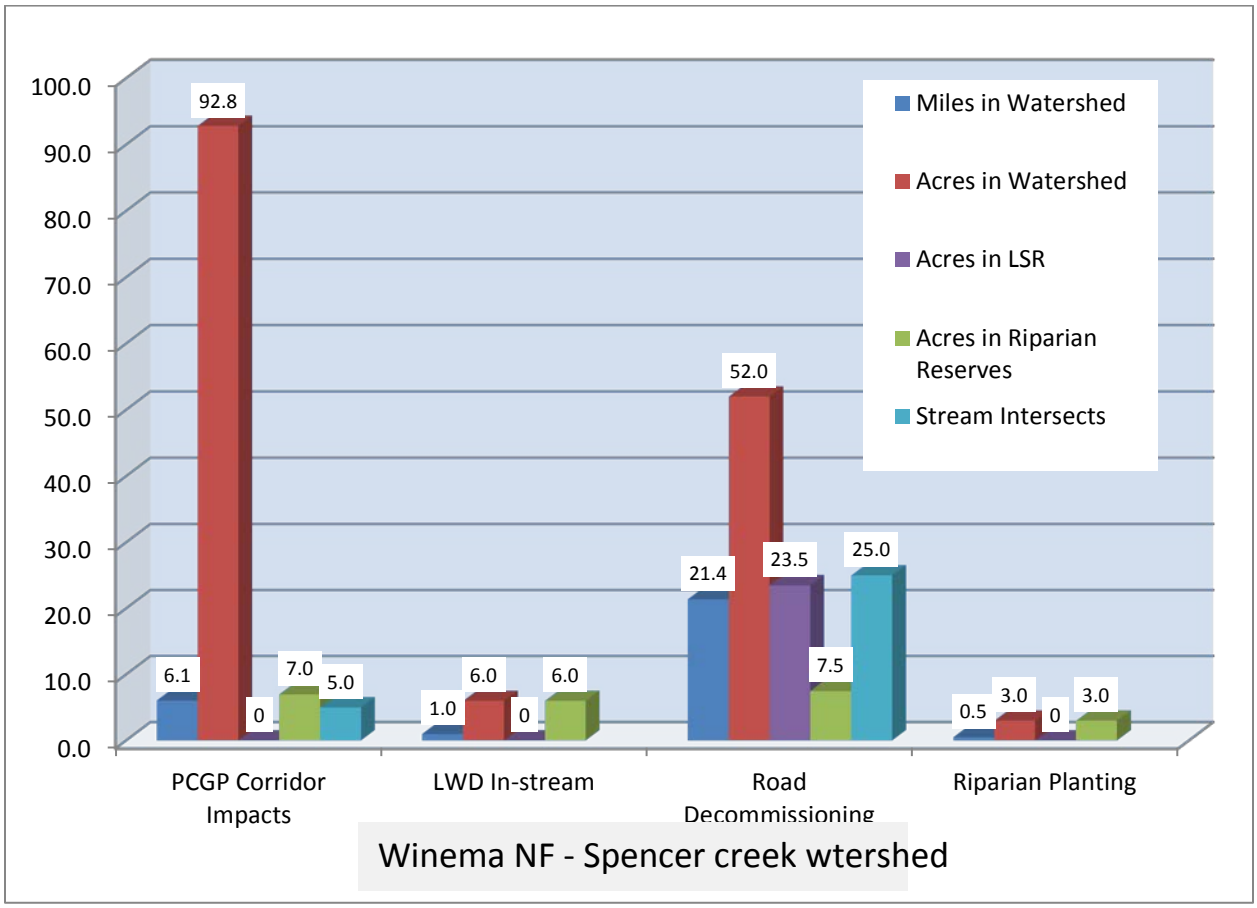
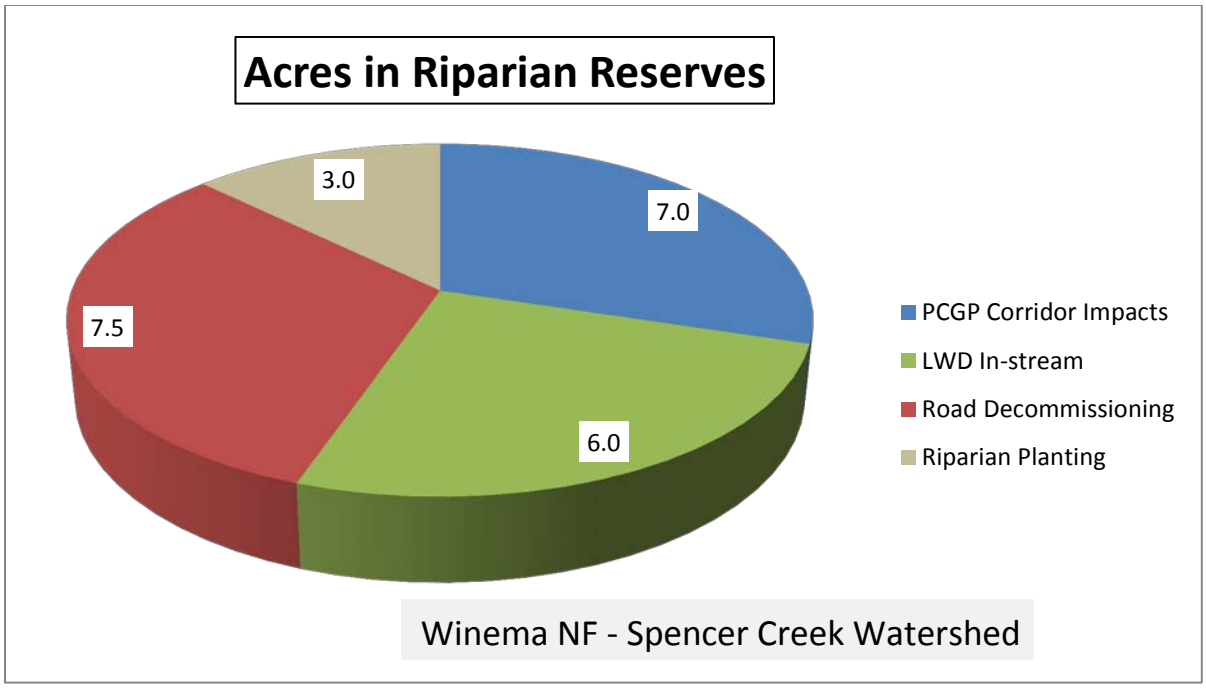


Figure 4-7b. Comparison of PCGP Impacts and Offsite Mitigation Actions in Riparian Reserves in the Spencer Creek Watershed



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5.0 SUMMARY OF TOTAL MITIGATION IN FIFTH-FIELD WATERSHEDS WHERE BOTH THE BLM AND FOREST SERVICE PROPOSE MITIGATION ACTIONS

There are several fifth-field watersheds crossed by the proposed Project that contain both BLM and Forest Service administered lands. The proposed mitigation actions by administrative unit are described in Sections 3 and 4 above including the rationale for each action. This section summarizes the total mitigation actions in fifth-field watersheds where both the BLM and Forest Service have proposed off-site mitigation actions. The Project impacts include the corridor, the TEWAs, and the UCSA. A more detailed description of each action by administrative unit is included in Sections 3 and 4 above. The fifth-field watersheds where both the BLM and Forest Service have proposed off-site mitigation actions include the Days Creek, Trail Creek, Little Butte Creek and Spencer Creek watersheds.

TABLE 5-1a

Mitigation Actions Proposed in the Days Creek South Umpqua Watershed on the BLM Roseburg District and the Umpqua NF

Admin Unit	Mitigation Group	Project Type	Project Name	Quantity	Unit
Roseburg BLM	Aquatic and Riparian Habitat	Fish Passage	Beal Creek Culvert Replacement	2	sites
Roseburg BLM	Aquatic and Riparian Habitat	LWD In-stream	Days Creek In-stream LWD	0.4	miles
Roseburg BLM	Aquatic and Riparian Habitat	LWD In-stream	West Fork Canyon	0.8	miles
Roseburg BLM	Fire suppression	Suppression Capacity	Dry Hydrants	6	sites
Roseburg BLM	Road Sediment Reduction	Road storm-proofing	31-4-3.2 Road Storm-proofing	1	project
Roseburg BLM	Road Sediment Reduction	Road Drainage and Surface Enhancement	South Umpqua Road Drainage and Surface Enhancement	10	miles
Roseburg BLM and Umpqua NF	Stand Density Fuel Break	Fuels Reduction	Days Creek South Umpqua Hazardous Fuel Reduction with approximately 232 acres in LSR	1382	acres
Umpqua NF	Road sediment reduction	Road Closure	Days Creek South Umpqua Road Closure	0.5	Miles
Umpqua NF	Stand Density Fuel Break	Pre-commercial Thinning	Days Creek South Umpqua LSR Pre-commercial Thinning	52.8	Acres
Umpqua NF	Stand Density Fuel Break	Under-burn	Days Creek South Umpqua LSR Under-burn	125	Acres
Umpqua NF	Stand Density Fuel Break	Under-burn	Days Creek South Umpqua Matrix Under-burn	102	Acres

TABLE 5-1b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Days Creek South Umpqua Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian reserves
PCGP Corridor Impacts	8.1	260.7	88.9	8.9
Stand Density Fuel Break		1536.6	661.5	222.0
Aquatic and Riparian Habitat	1.2	7.3	0.0	7.3
Road Sediment Reduction	10.5	25.5	15.8	3.2

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM/USFS GIS files
b/ Offsite Mitigation Actions Data Source: BLM and Forest Service GIS files
Note: Aquatic and Riparian Habitat acres based on an estimate of a 50' wide treatment area
Road Sediment Reduction acres based on an estimate of a 20' wide treatment area

Figure 5-1a. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in the Days Creek South Umpqua Watershed

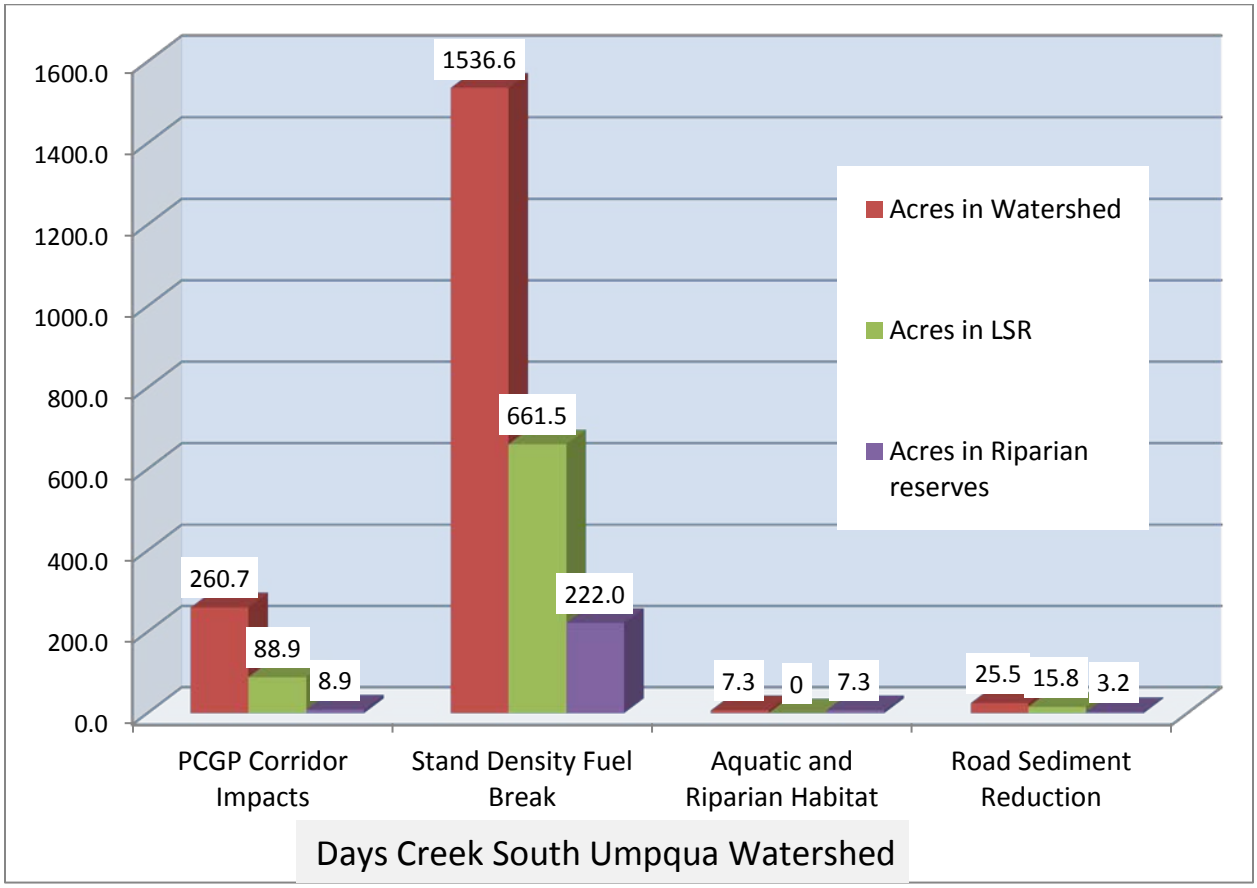


Figure 5-1b. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in LSR in the Days Creek South Umpqua Watershed

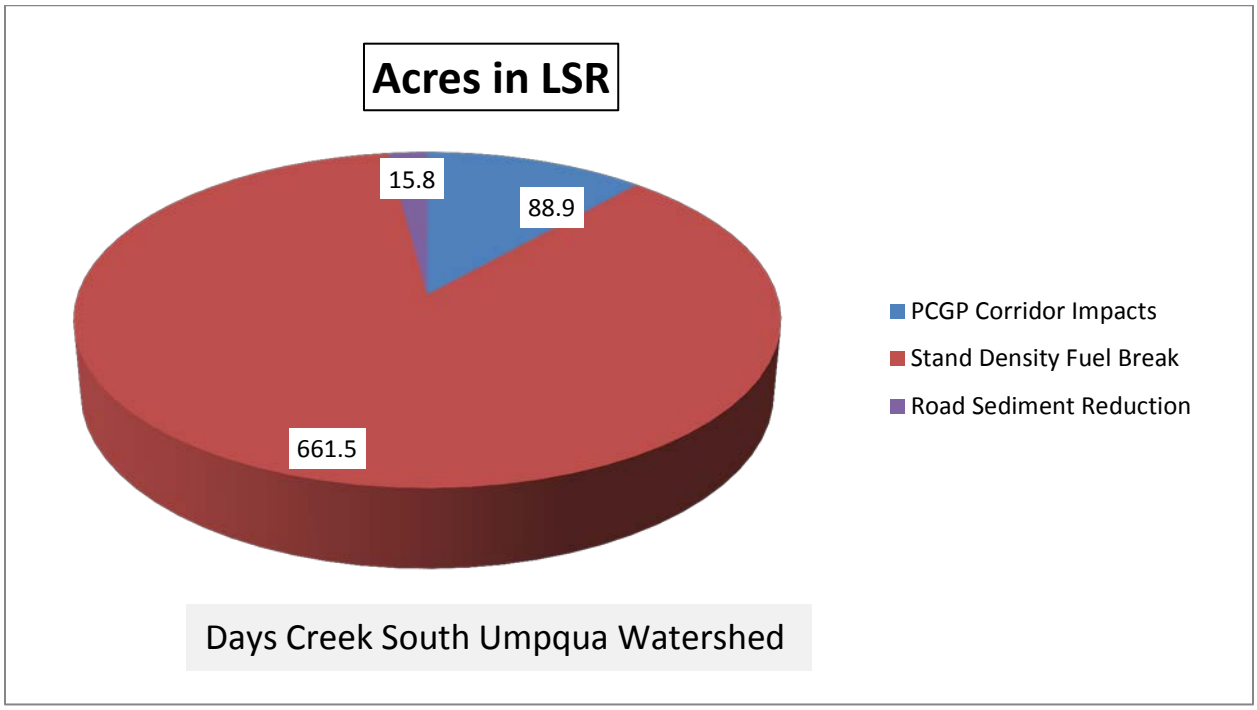


Figure 5-1c. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in Riparian Reserves in the Days Creek South Umpqua Watershed

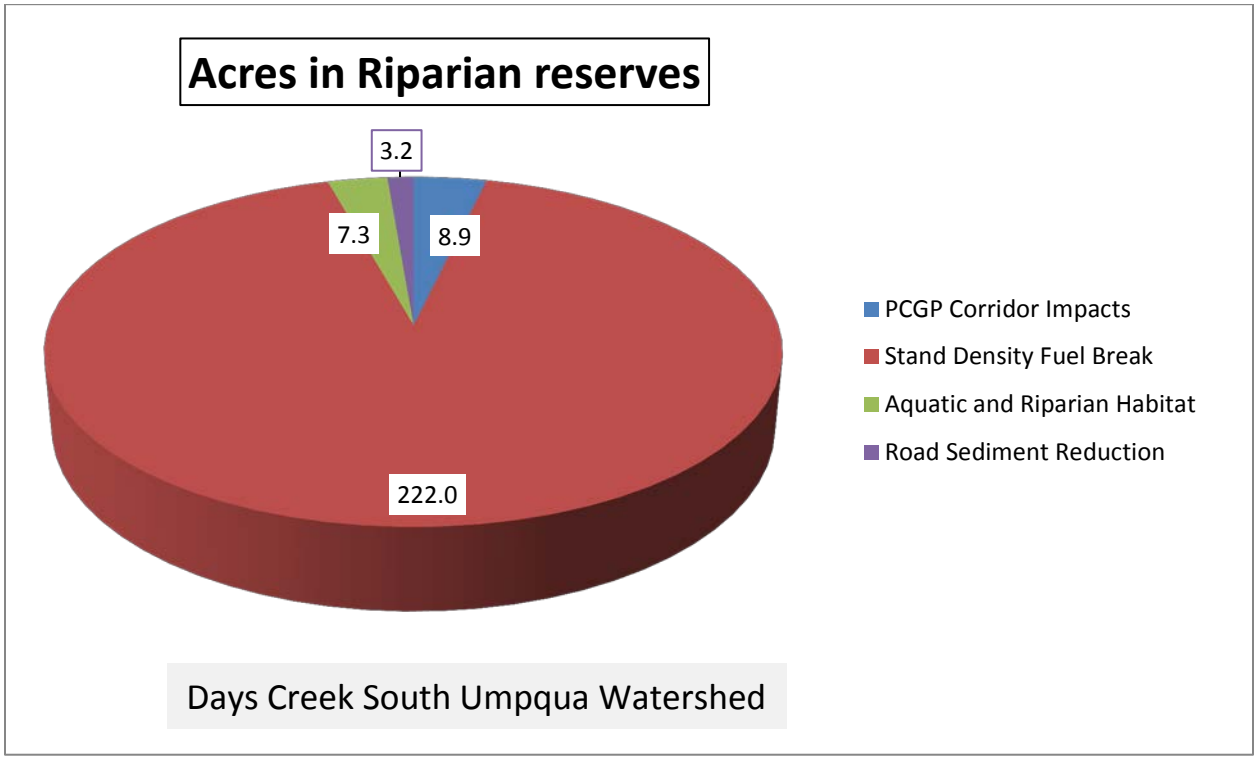


TABLE 5-2a

Mitigation Actions Proposed in the Trail Creek Watershed on the BLM Medford District and the Umpqua NF

Admin Unit	Mitigation Group	Project Type	Project Name	Quantity	Unit
Medford BLM	Aquatic and Riparian Habitat	LWD In-stream	Trail Creek LWD	2.6	miles
Medford BLM	Fire suppression	Suppression Capacity	Trail Creek Pump Chance	8	sites
Medford BLM and Umpqua NF	Road Sediment Reduction	Road storm- proofing	Trail Creek Road Storm-proofing	4.8	miles
Medford BLM and Umpqua NF	Road Sediment Reduction	Road Decommissioning	Trail Creek Road Decommissioning	3.8	miles
Medford BLM	Road Sediment Reduction	Road Surfacing	Trail Creek Road Resurface	16.3	miles
Medford BLM and Umpqua NF	Stand Density Fuel Break	Fuels Reduction	Trail Creek Fuel Hazard Reduction	1101.2	acres
Medford BLM	Stand Density Fuel Break	fuels Reduction	Trail Creek Fuels Hazard Maintenance	687	acres
Umpqua NF	Stand Density Fuel Break	Under-burn	Trail Creek Matrix Under-burn	280	Acres
Umpqua NF	Terrestrial Habitat Improvement	Snag Creation	Trail Creek Matrix Snag Creation	108.6	Acres

TABLE 5-2b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Trail Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian reserves
PCGP Corridor Impacts	6.0	124.4	0.0	5.1
Stand Density Fuel Break		1381.2	0.0	226.0
Aquatic and Riparian Habitat	2.6	15.8	0.0	15.8
Terrestrial Habitat Improvement		108.6	0.0	0.0
Road Sediment Reduction	24.9	60.4	0.0	10.7

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM/USFS GIS files
b/ Offsite Mitigation Actions Data Source: BLM and Forest Service GIS files
Note: Aquatic and Riparian Habitat acres based on an estimate of a 50' wide treatment area
Road Sediment Reduction acres based on an estimate of a 20' wide treatment area

Figure 5-2a. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in the Trail Creek Watershed

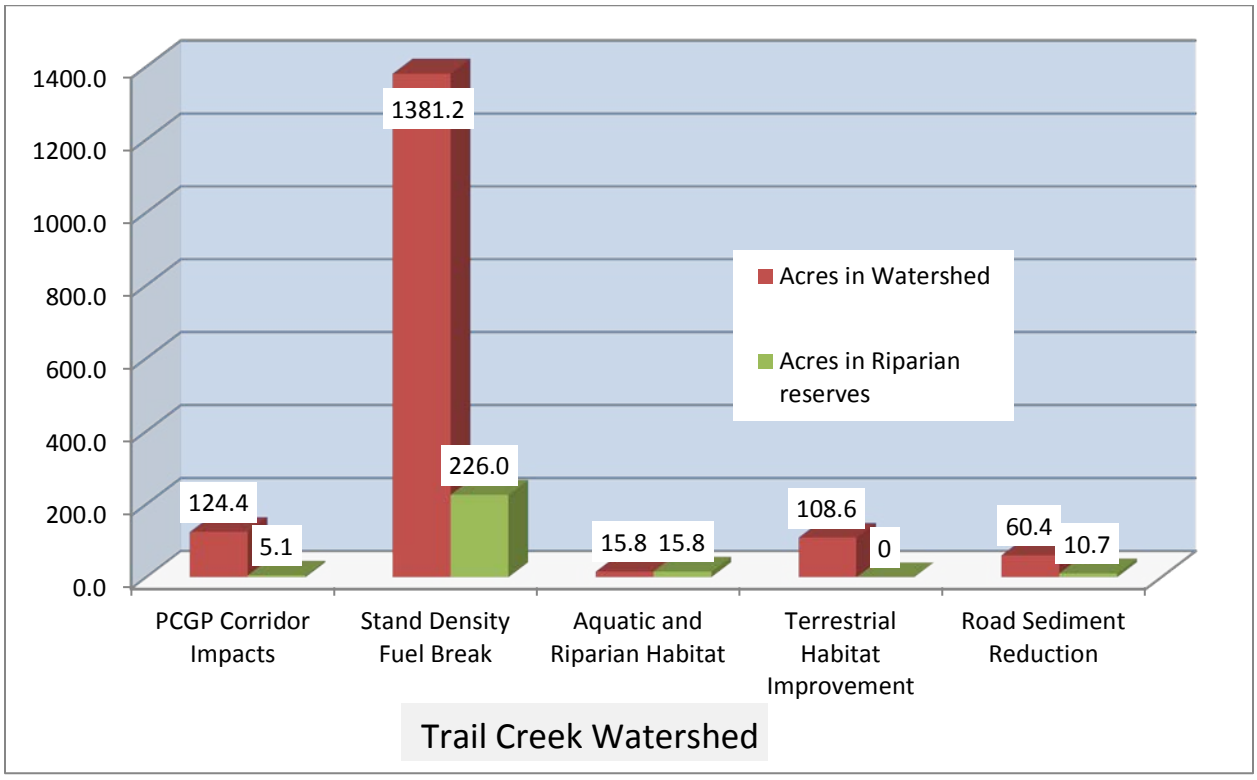


Figure 5-2b. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in Riparian Reserves in the Trail Creek Watershed

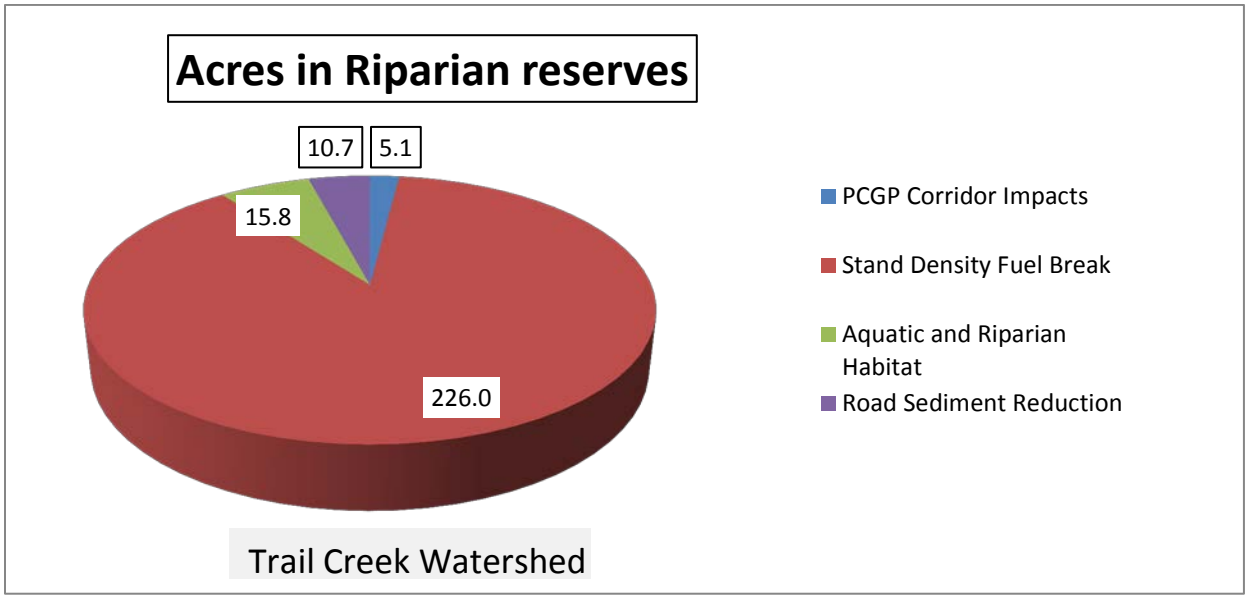


TABLE 5-3a

Mitigation Actions Proposed in the Little Butte Creek Watershed on the BLM Medford District and the Rogue River NF

Admin Unit	Mitigation Group	Project Type	Project Name	Quantity	Unit
Medford BLM	Aquatic and Riparian Habitat	Fish Passage	Little Butte Creek Fish Screen	1	site
Medford BLM and Rogue River NF	Aquatic and Riparian Habitat	LWD In-stream	Lost Creek and Little Butte Creek In-stream LWD	10.1	miles
Medford BLM	Fire suppression	Suppression Capacity	Little Butte Creek Pump Chance	8	sites
Medford BLM	Road Sediment Reduction	Road Drainage and Surface Enhancement	Little Butte Creek Road Improvement	3.5	miles
Medford BLM and Rogue River NF	Road Sediment Reduction	Road Decommissioning	Little Butte Creek Road Decommissioning	66.2	miles
Medford BLM	Road Sediment Reduction	Road Surfacing	Little Butte Creek Road Resurfacing Ashland Resource Area and Butte Falls Resource Area	18.3	miles
Rogue River NF	Aquatic and Riparian Habitat	Stream Crossing Repair	Little Butte Creek Stream Crossing Decommissioning	32	Sites
Rogue River NF	Stand Density Fuel Break	Pre-commercial Thinning	Little Butte Cr LSR Pre-commercial Thin	617.8	Acres
Rogue River NF	Terrestrial Habitat Improvement	Habitat Planting	Little Butte Creek Mardon Skipper Butterfly	20	Acres
Rogue River NF	Terrestrial Habitat Improvement	LWD Upland Placement	Little Butte Creek LSR LWD Placement	306	Acres
Rogue River NF	Terrestrial Habitat Improvement	Snag Creation	Little Butte Creek LSR Snag Creation	622	Acres
Rogue River NF	Reallocation of Matrix Lands to LSR	Reallocation of Matrix to LSR	LSR 227 Addition	12	Acres

TABLE 5-3b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Little Butte Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian reserves
PCGP Corridor Impacts	19.7	387.4	279.5	17.1
Stand Density Fuel Break		617.8	617.8	59.0
Aquatic and Riparian Habitat	10.1	61.2	9.1	61.2
Terrestrial Habitat Improvement		948.0	928.0	96.8
Road Sediment Reduction	88.0	213.3	129.0	24.9

a/ Data Source: 2013 PCGP License Application and BLM/USFS GIS files
b/ Data Source: BLM and Forest Service GIS files
Aquatic and Riparian Habitat acres based on an estimate of a 50' wide treatment area
Road Sediment Reduction acres based on an estimate of a 20' wide treatment area

Figure 5-3a. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in the Little Butte Creek Watershed

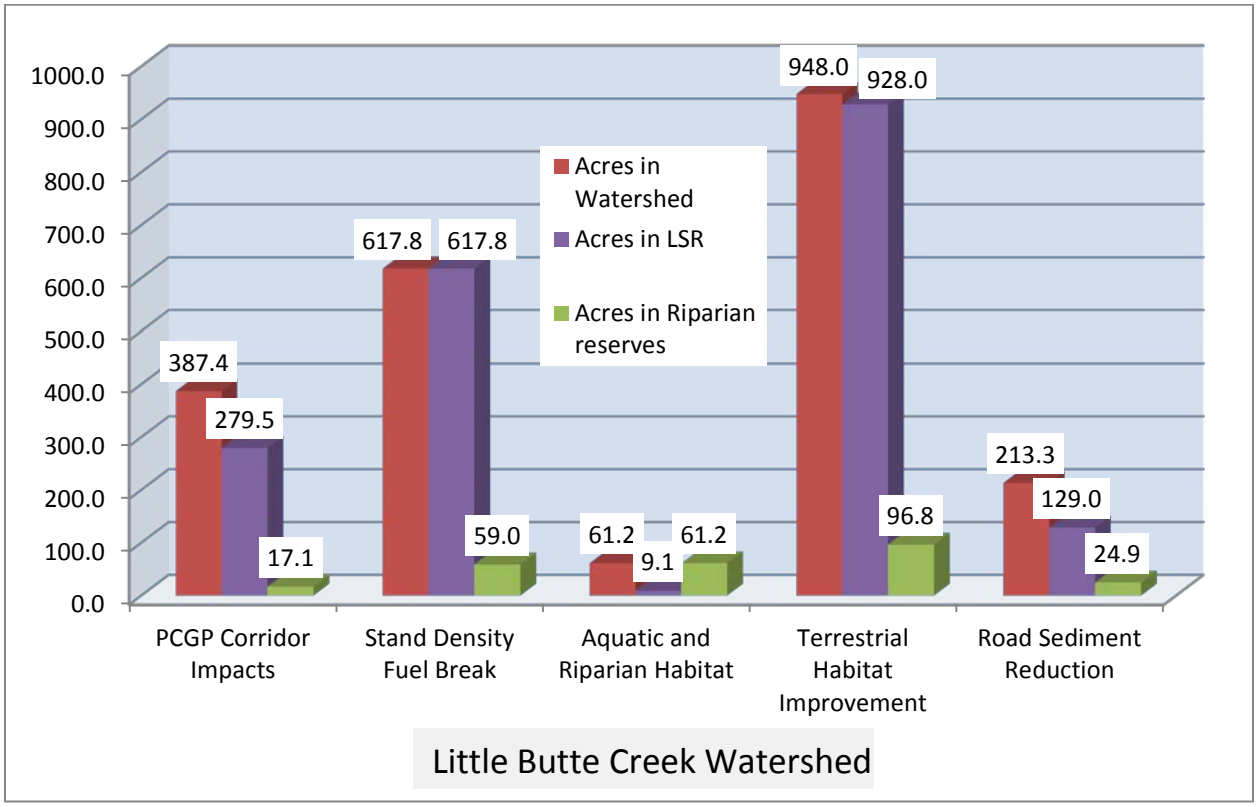


Figure 5-3b. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in LSR in the Little Butte Creek Watershed

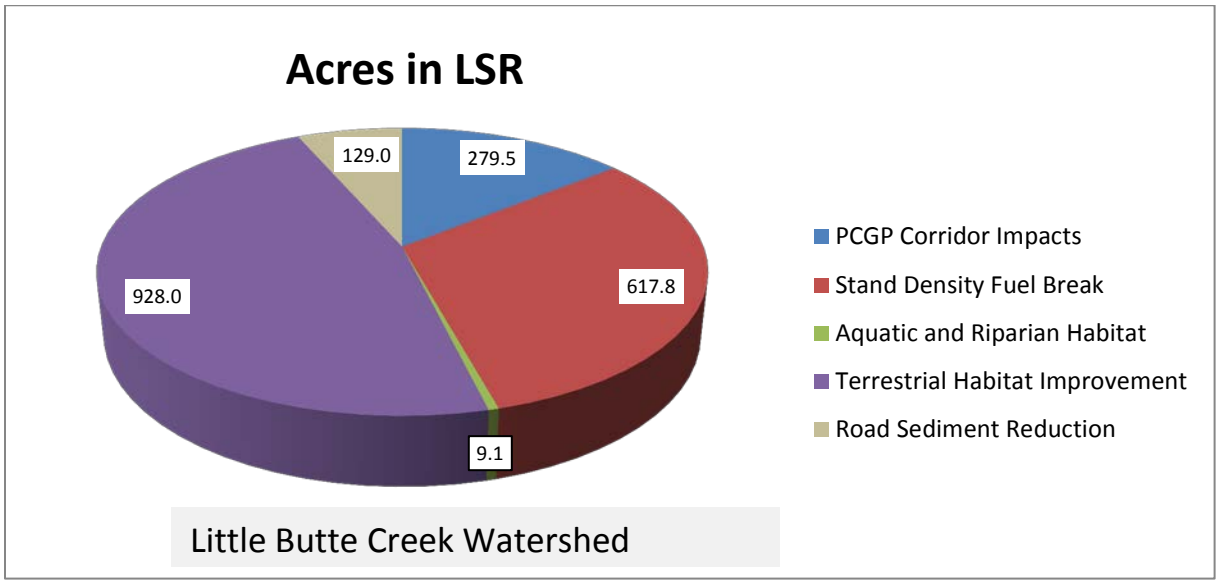


Figure 5-3c. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in Riparian Reserves in the Little Butte Creek Watershed

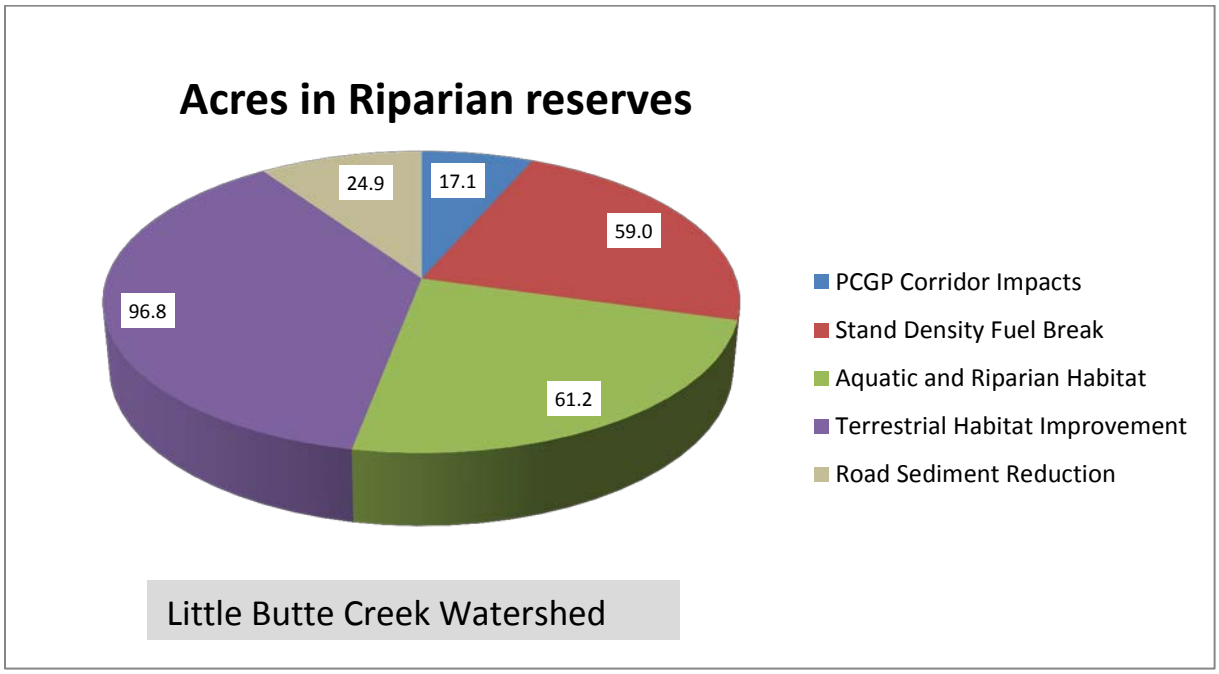


TABLE 5-4a

Mitigation Actions Proposed in the Spencer Creek Watershed on the BLM Lakeview District and the Winema NF

Admin Unit	Mitigation Group	Project Type	Project Name	Quantity	Unit
Lakeview BLM	Stand Density Fuel Break	Riparian Vegetation	Upper Spencer Creek And Miners Creek LSR/Riparian treatment	6.0	miles
Lakeview BLM	Stand Density Fuel Break	Riparian Vegetation	Tributary Creek Riparian Thinning	70	acres
Lakeview BLM	Road Sediment Reduction	Road Drainage - Culvert Replacement	Keno Access Road Repair and Culvert Replacement	1	site
Lakeview BLM	Road Sediment Reduction	Road Drainage	Spencer Creek Drainage Improvements and Sediment Trap Removal	15	sites
Lakeview BLM	Road Sediment Reduction	Road Closure	Spencer Creek Repair Existing Road Closure	12	sites
Lakeview BLM	Stand Density Fuel Break	Stand Density Habitat	Upper Spencer Creek LSR Density Mgt.	270	acres
Winema NF	Aquatic and Riparian Habitat	Riparian Planting	Spencer Creek Riparian Planting	0.5	Mile
Winema NF	Aquatic and Riparian Habitat	Fencing	Spencer Creek Fencing	6.4	Miles
Winema NF	Aquatic and Riparian Habitat	LWD In-stream	Spencer Creek In-stream LWD	1.0	Mile
Winema NF	Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Ford Hardening and Interpretive Sign	1	Site
Winema NF	Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Stream Crossing Decommissioning	25	Sites
Winema NF	Road sediment reduction	Road Decommissioning	Spencer Creek Road Decommissioning	21.4	Miles
Winema NF	Visuals	Stand Density Reduction	Clover Creek Visual Mgt.	113.5	Acres

TABLE 5-4b

Comparison of PCGP Impacts and Offsite Mitigation Actions a/ b/

Spencer Creek Watershed	Miles in Watershed	Acres in Watershed	Acres in LSR	Acres in Riparian reserves
PCGP Corridor Impacts	7.1	107.7	0.0	9.1
Stand Density Fuel Break		412.7	112.9	150.8
Aquatic and Riparian Habitat	1.5	9.1	0.0	9.1
Road Sediment Reduction	21.4	53.7	23.5	9.2

a/ PCGP Impacts Data Source: 2013 PCGP License Application and BLM/USFS GIS files
b/ Offsite Mitigation Actions Data Source: BLM and Forest Service GIS files
Note: Aquatic and Riparian Habitat acres based on an estimate of a 50' wide treatment area
Road Sediment Reduction acres based on an estimate of a 20' wide treatment area

Figure 5-4a. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in the Spencer Creek Watershed

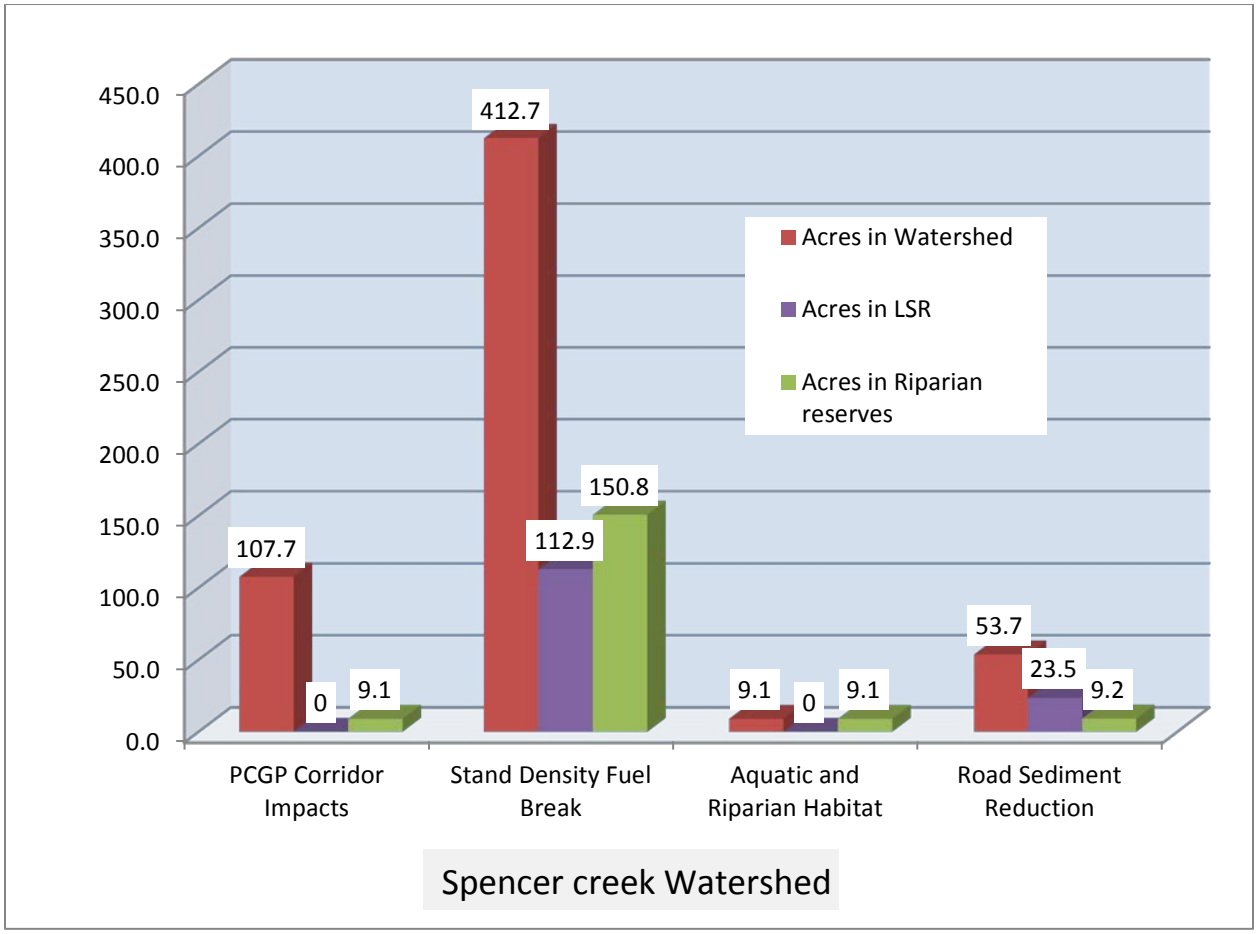
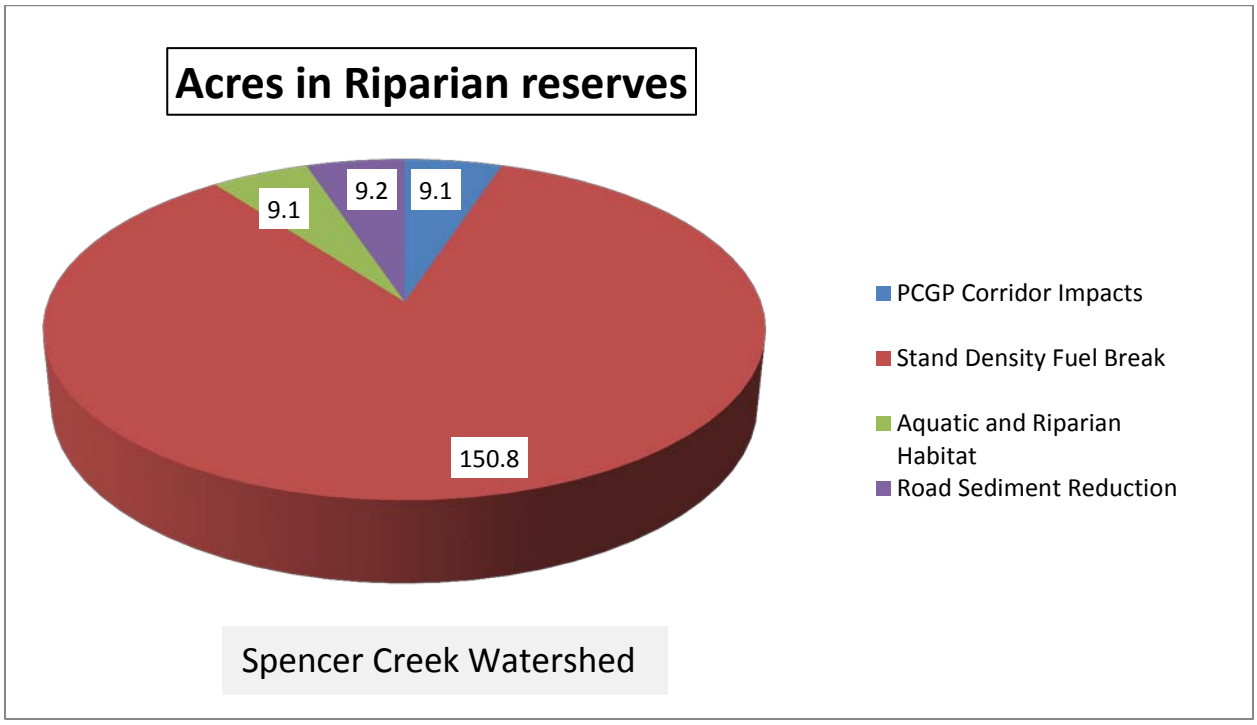


Figure 5-4b. Comparison of PCGP Impacts and Offsite Mitigation Actions by Mitigation Group in Riparian Reserves in the Spencer Creek Watershed



6.0 MAPS OF MITIGATION ACTIONS FOR EACH ADMINISTRATIVE UNIT OF THE BLM AND FOREST SERVICE

Figure 6-1. Map of Mitigation Actions on the BLM Coos Bay District

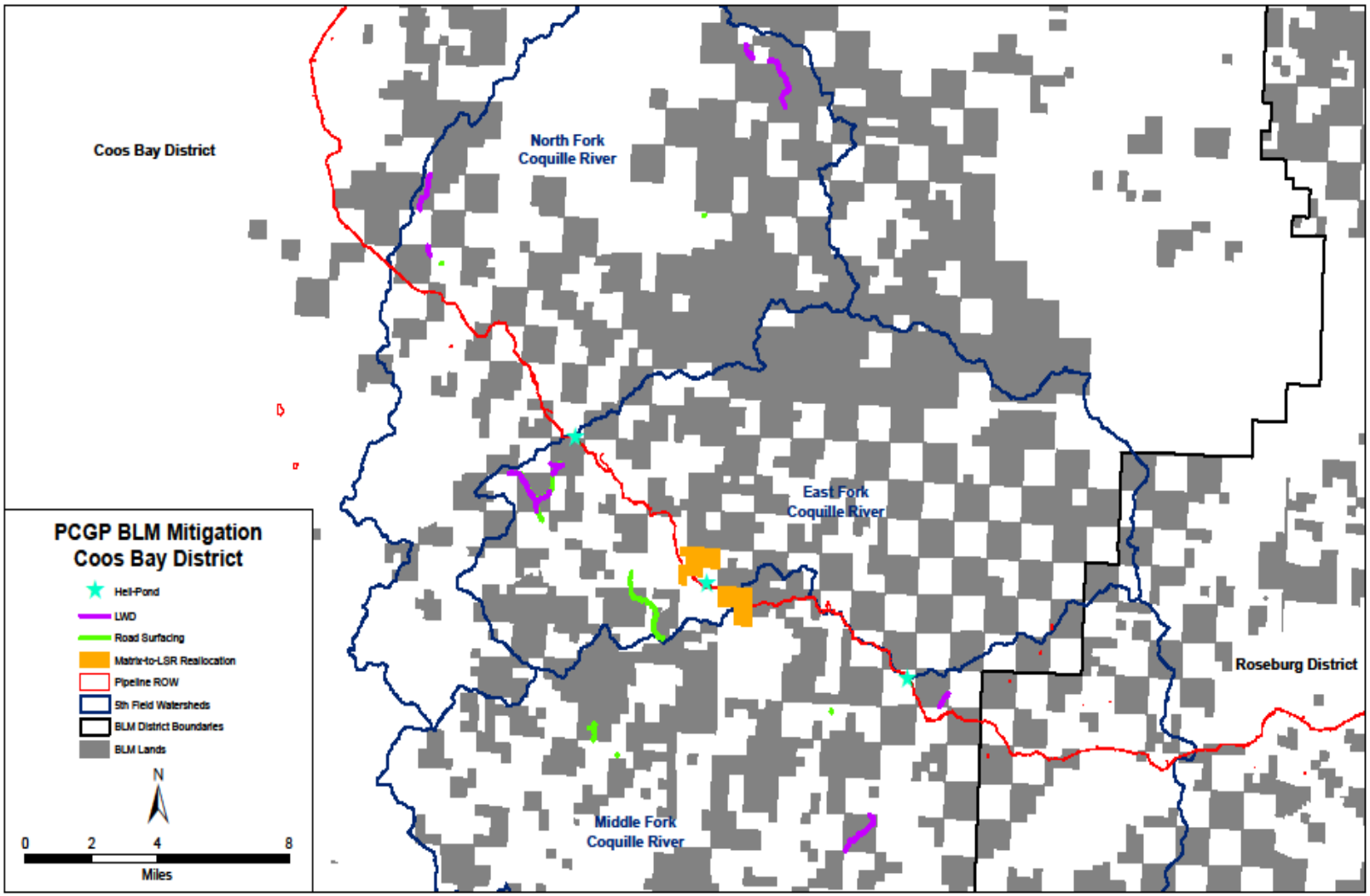


Figure 6-2. Map of Mitigation Actions on the BLM Roseburg District

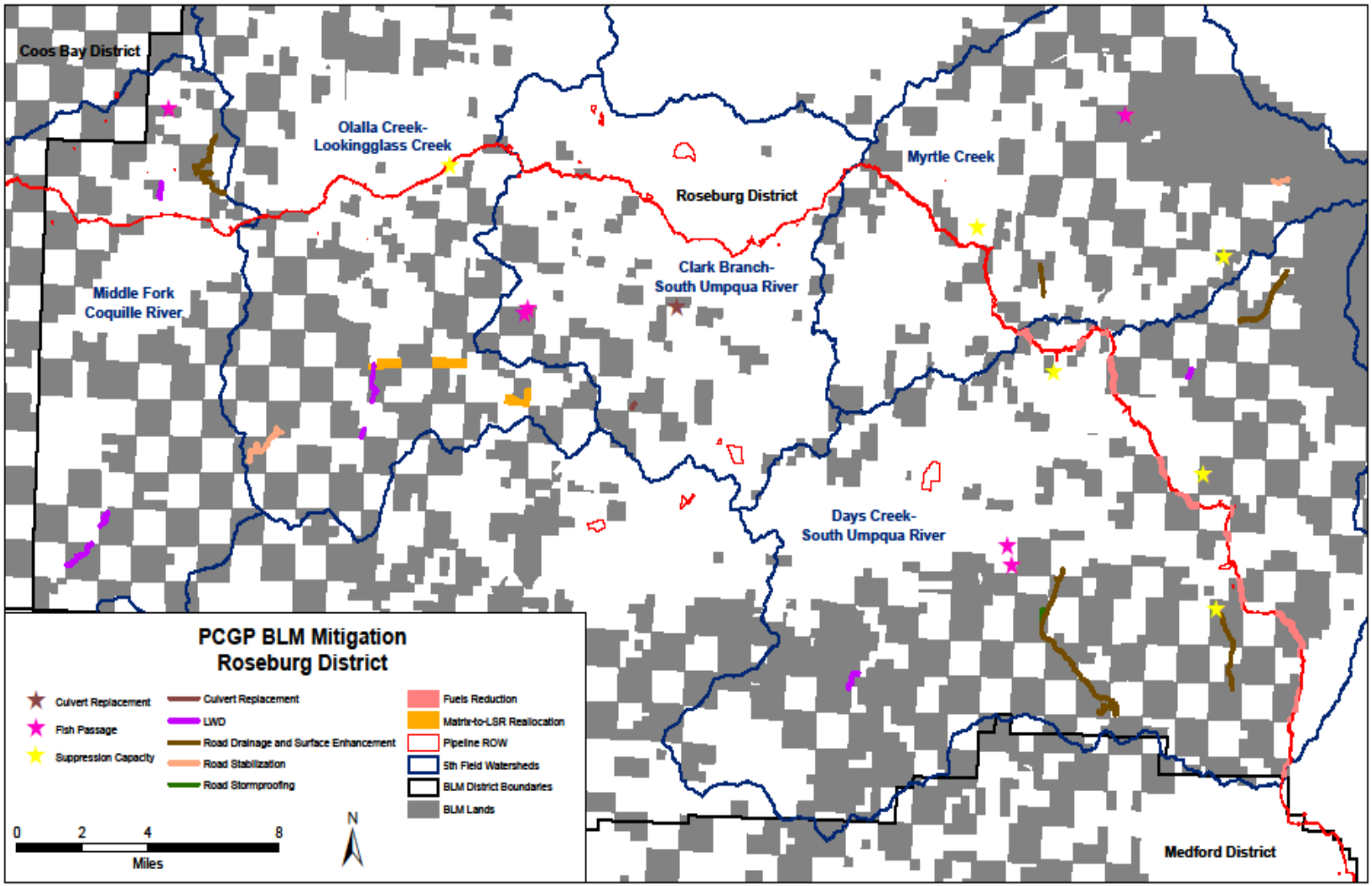


Figure 6-3. Map of Mitigation Actions on the BLM Medford District

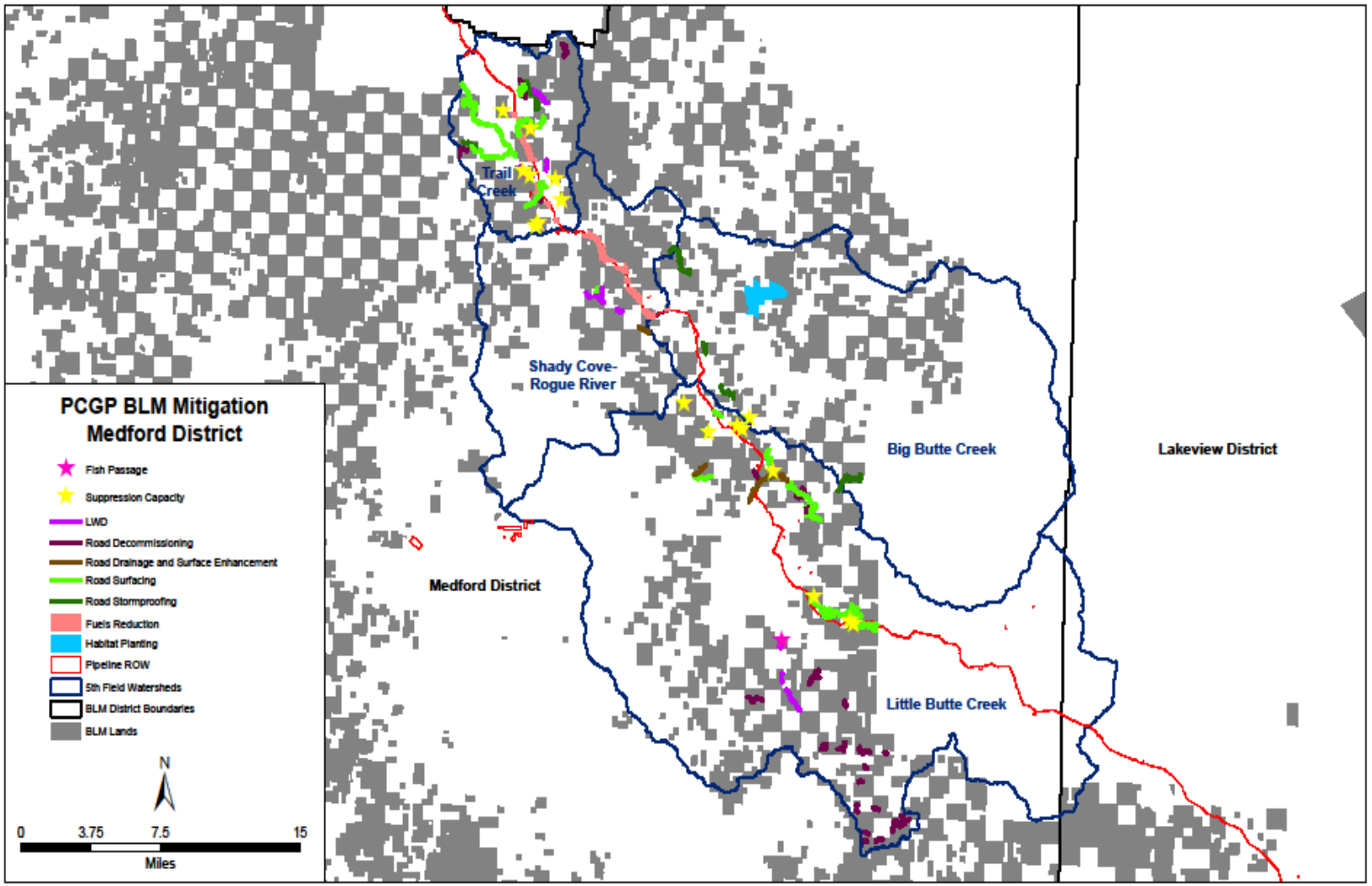


Figure 6-4. Map of Mitigation Actions on the BLM Lakeview District

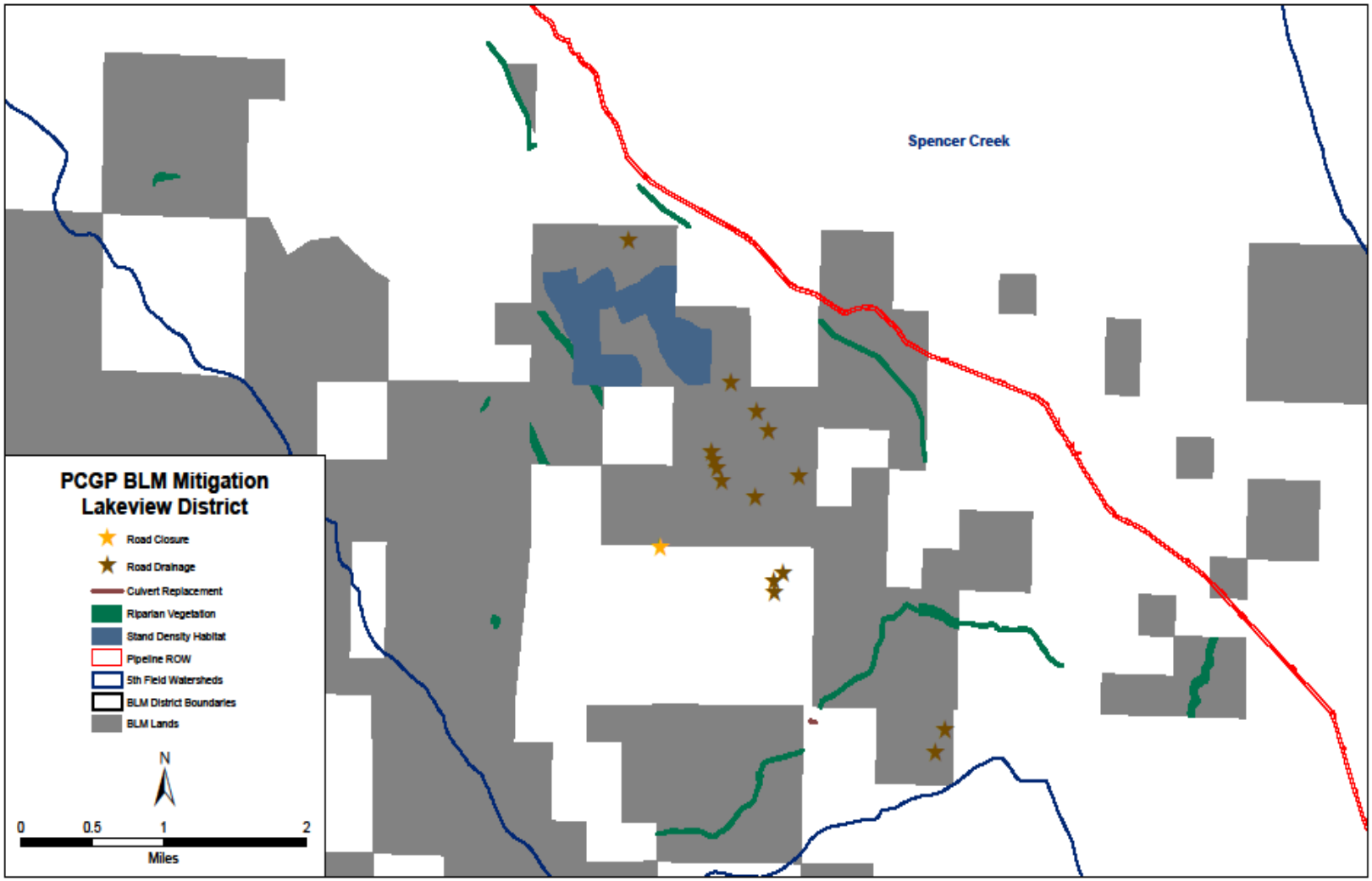


Figure 6-5. Map of Mitigation Actions on the Umpqua National Forest

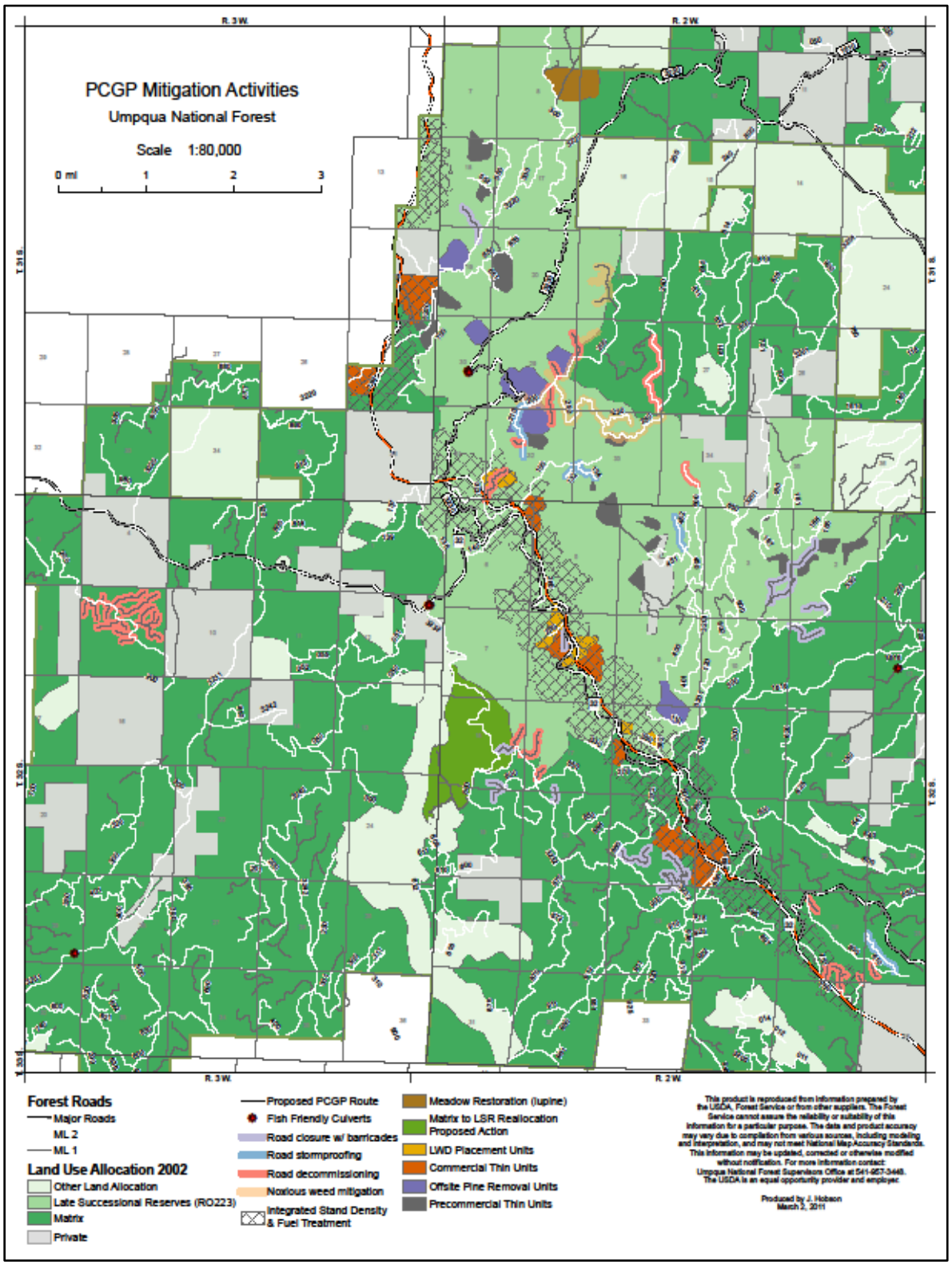


Figure 6-6. Map of Snag Creation Mitigation Actions on the Umpqua National Forest

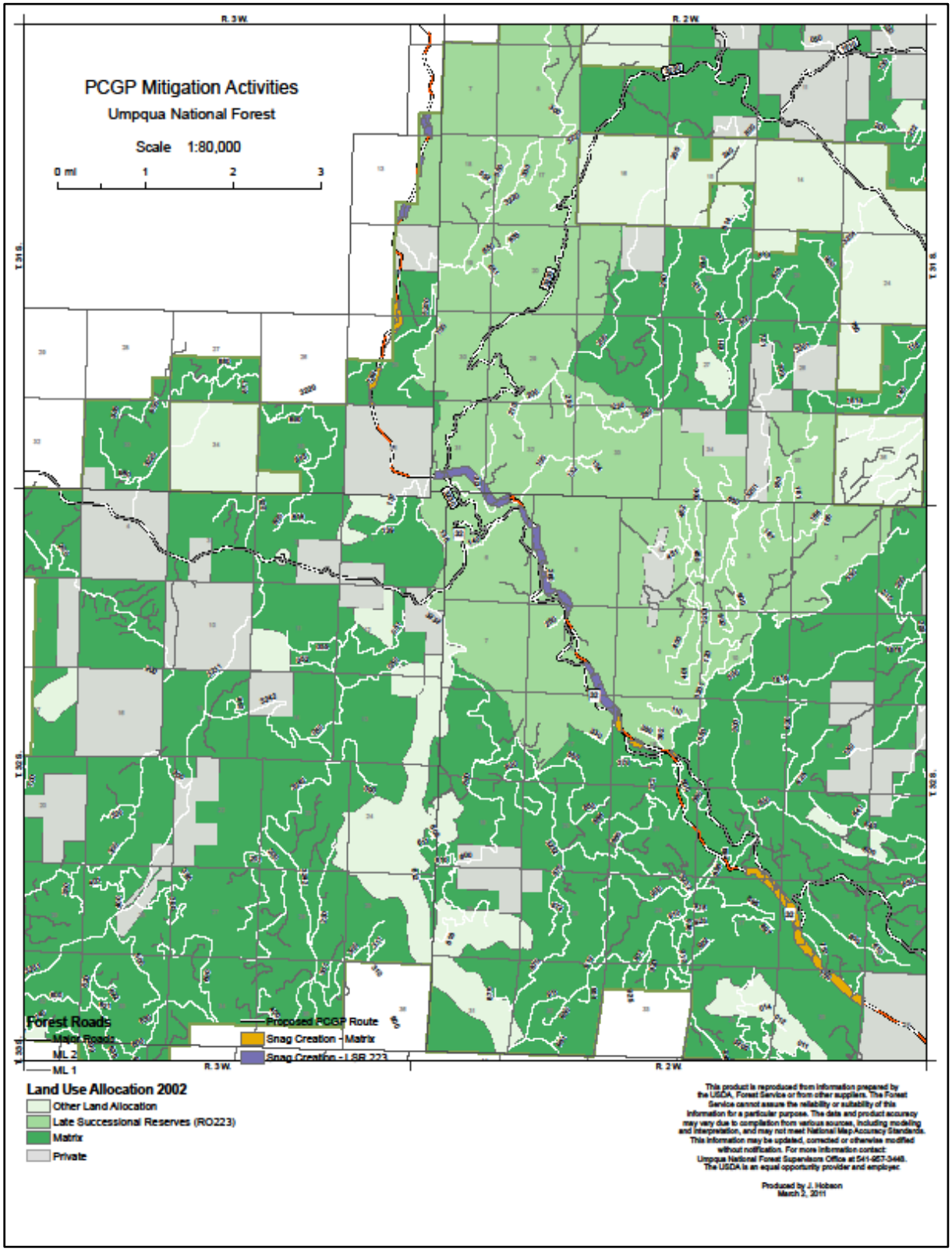


Figure 6-7. Map of Mitigation Actions on the Rogue River National Forest

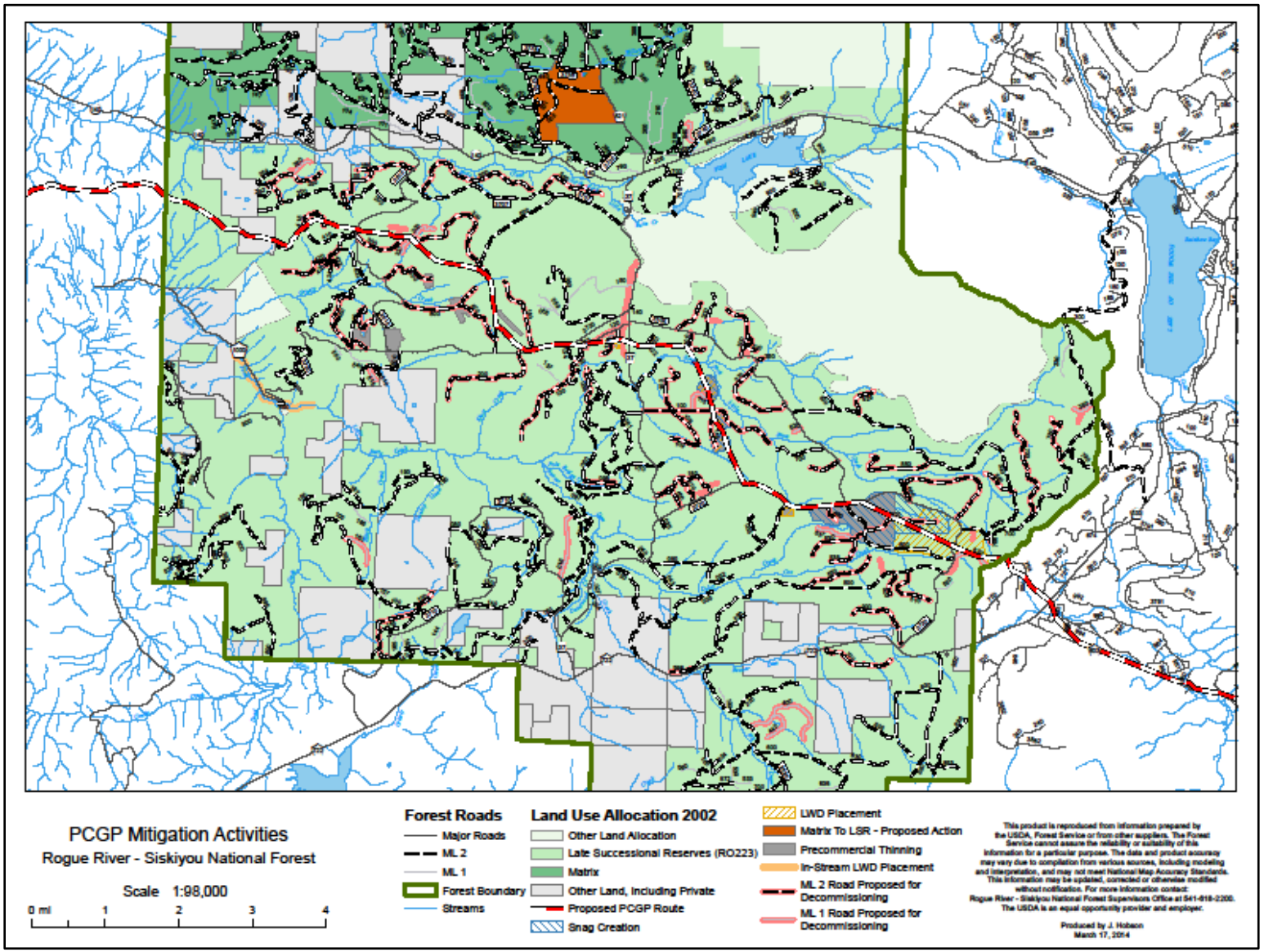


Figure 6-8. Map of Mitigation Actions on the Winema National Forest

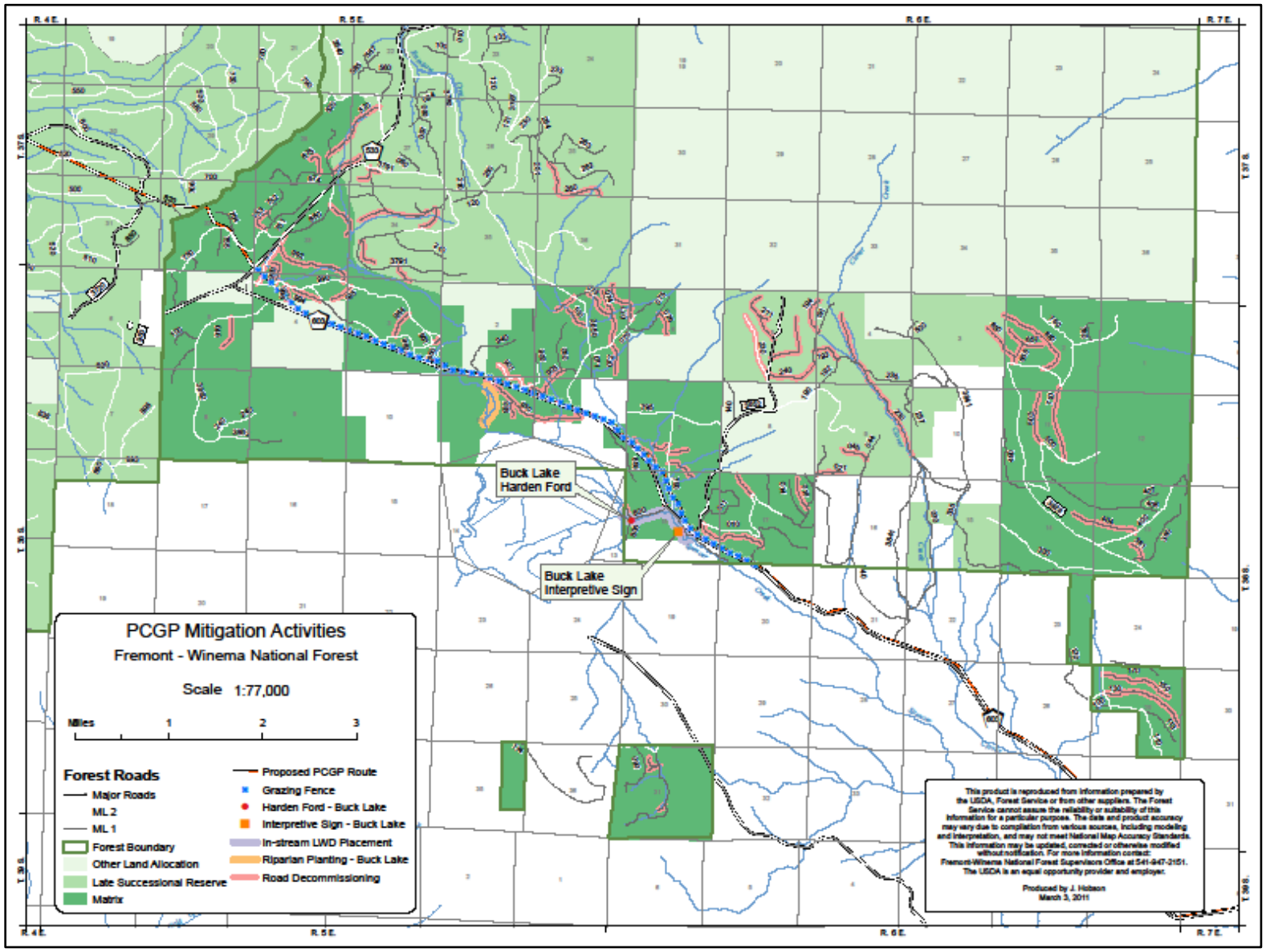
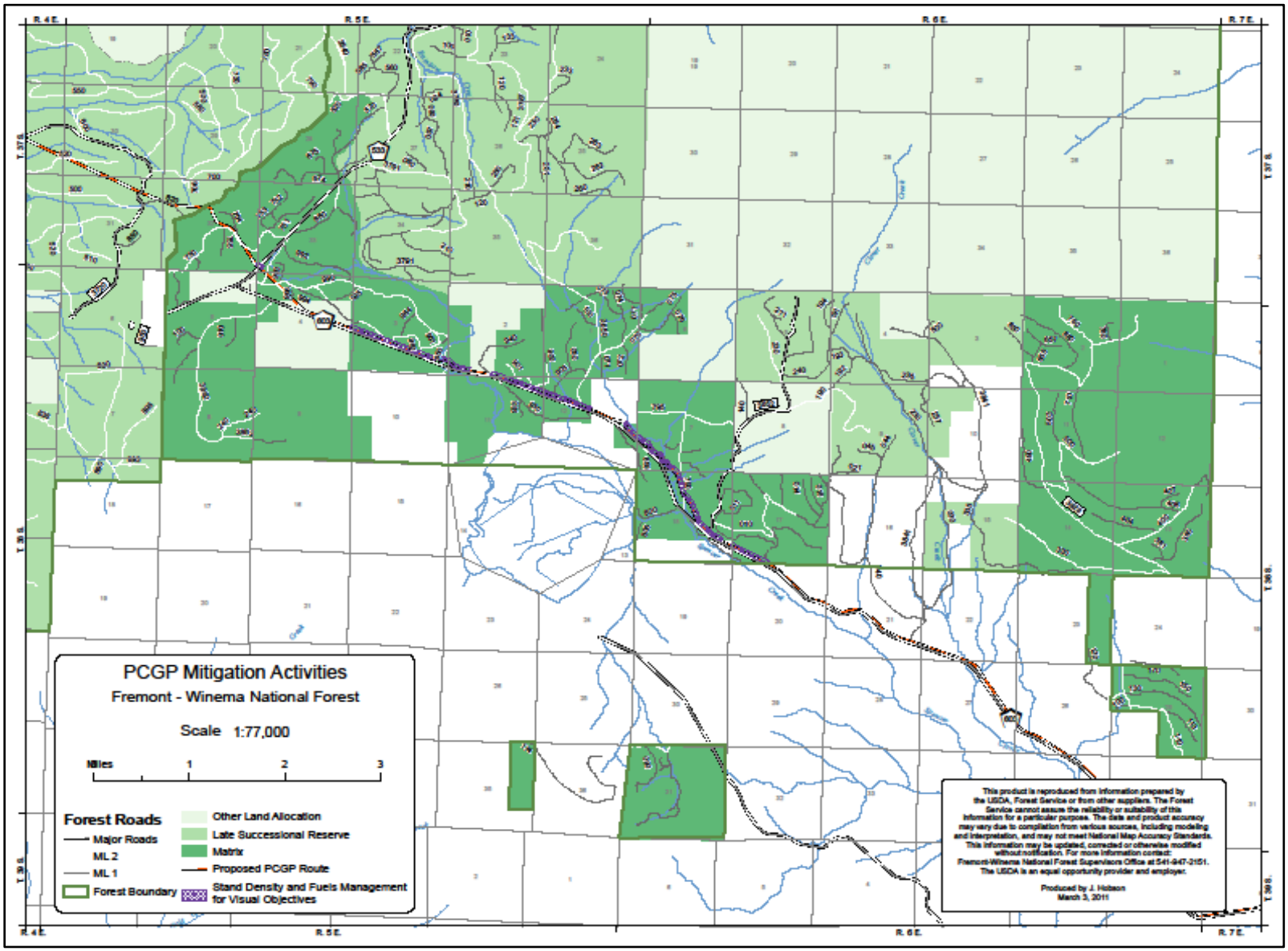


Figure 6-9. Map of Visual Mitigation Actions on the Winema National Forest



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8.0 ATTACHMENTS

Attachment 1

BLM Mitigation Summary v.2

BLM Mitigation Summary

Introduction and Background

This document provides a summary of proposed BLM mitigation projects associated with the Pacific Connector Gas Pipeline. These projects were developed by BLM staff and approved by BLM Line Officers in a meeting on March 21, 2012. This analysis was developed by North State Resources and reviewed by the BLM. Its intended purpose is to provide context and information for completion of an Agreement in Principle between the Pacific Connector LLC and the BLM for off-site mitigations associated with the Pacific Connector Gas Pipeline Project. The policy framework for off-site mitigations by proponents of projects is provided by the BLM Offsite Mitigation Policy found in Appendix A.

Proposed mitigation projects are intended to be responsive to Resource Management Plan (RMP) objectives that include:

- Compliance with the Aquatic Conservation Strategy of the Northwest Forest Plan
- Habitat for T&E species including northern spotted owls, marbled murrelets and coho salmon
- Mitigation of impacts on Late Successional Reserves
- Specific resource issues as they occur by watershed

Offsite mitigation is a supplemental mitigation to address important issues or land management plan objectives that cannot be acceptably mitigated on-site. This document is organized by watershed, with a brief description of watershed issues and proposed mitigations. Watershed issues and conditions were extracted from agency assessments and local knowledge of the area.

Table 1-1 and associated chart show the miles by watershed by land management agency for both BLM and FS lands. NFS lands are included because the BLM and Forest Service jointly manage several watersheds.

Mitigation Groups

Aquatic Restoration

Aquatic restorations are aimed accomplishing objectives of the Aquatic Conservation Strategy (ACS) and offsetting project impacts at the watershed scale. Proposed projects are located in the 5th field watersheds where the PCGP occurs but because of the checkerboard nature of BLM ownerships, feasible projects may not be located in the same subwatersheds as the project.

LWD Instream

Placement of LWD in streams adds structural complexity to aquatic systems by creating pools and riffles, trapping fine sediments and can contribute to reductions in stream temperatures over time (Tippery, Jones et al. 2010) This is responsive to Aquatic Conservation Strategy objectives 2, 3, 4 and 5.

Road Surfacing and Drainage Repair

Road surfacing reduces sediment by capping existing fine textured sediments in the running surface of a gravel road with coarser rock or by paving. Paving all but eliminates traffic-generated sediments. Drainage repair reestablishes out-sloping, cross-drains and in some cases ditchlines to ditch-relief culverts. These actions have the effect of getting water off the road before it can enter streamcourses. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (USDA FS and USDI BLM 1994b p. B-11, C-7)

Road Decommissioning

Decommissioning roads can substantially reduce sediment delivery to streams (Madej 2000; Keppeler, Cafferata et al. 2007). Proposed road decommissioning will increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the PCGP occur. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (USDA FS and USDI BLM 1994b p. B-11, C-7)

Fish Passage Culvert Replacement

Old culverts may block fish passage either by poor design or by failure over time. Removing these blockages and replacing them with fish-friendly designs can allow fish and other aquatic organisms to access previously unavailable habitat. This is responsive to ACS Objectives 1, 2, 3 and 9.(USDA FS and USDI BLM 2012)

Reallocation of Matrix Lands to Late Successional Reserves / Acquisition of Matrix Lands

The primary mitigation for the effects of the PCGP corridor on the Late Successional Reserve land allocation is to replace those acres of LSR in the corridor with additional acres of late-successional and old-growth habitat that are currently outside of the LSR to ensure that there are as many effective acres managed for LSR after the project as there were before the project. This is accomplished by the reallocation of land from the matrix land allocation to the LSR land allocation through a plan amendment. Reallocation of matrix lands to LSR also contributes to ACS objectives and may benefit Survey and Manage species over time by providing additional habitat that is managed to create LSOG stand conditions over time. Since the land reallocated to LSR comes out of the O&C matrix timber base, there is a need to replace those lands with other timber-producing lands to meet the BLM policy of no net loss of O&C lands. It is expected these lands would be acquired by the applicant and provided to the BLM to be managed as part of the O&C timber base.

Terrestrial Restoration

Terrestrial restoration projects are generally directed at mitigating direct and indirect effects of the Pacific Connector on late-successional and old-growth habitats and on reducing the risk of stand replacing fire.

Fire Protection

High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP. Fire control is necessary to protect Late Successional Reserves and endangered species habitat should a wildfire occur. Construction of the pipeline and associated activities removes both mature and developing stands and will increase fire suppression complexity however the corridor also provides a fuel break. Quick response time is imperative for successful control in wildfire situations during initial attack. Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts.

Fuels Reduction

Late Successional Reserve Assessments in SW Oregon have noted shifts from forests dominated by fire-resistant LSOG stands to fire-prone early and mid-seral forests (USDA FS, USDI BLM et al. 1998; USDS FS and USDI BLM 1999). Use of fuels reduction and stand density management are appropriate tools to reduce the risk of high intensity stand replacement fires in these forests (USDA FS and USDI BLM 1994b). Management activities that reduce the risk of natural disturbance adjacent to Known Owl Activity Centers is also appropriate (USDA FS and USDI BLM 1994b p. C-11). Extensive fuels reductions projects are planned on the Umpqua National Forest. Integrating project proposals with existing projects or planned PCGP fuel reduction mitigations on the Umpqua National Forest could result in a more effective pattern of fuels reduction. Stand density reductions in riparian zones have the dual benefit of reducing the risk of stand-replacing fire, while also accelerating the development of late successional stand conditions by accelerating growth of remaining trees.

Specialized Habitats

Fritillaria

The Pacific Connector may impact habitat of *Fritillaria gentneri.* Outplanting bulbs is consistent with the Recovery Plan for this species and would offset any possible losses from impacts to habitat.

Assumptions for Comparisons

1. Comparisons in bar graphs are absolute values and do not represent calibrated indices or relative values. They are intended to illustrate the absolute values of direct effects for the purposes of comparison unless otherwise noted. Relative values are nearly impossible to model for multiple variables because of differences in landscapes, weather patterns, historic conditions and the stochastic character of natural events. Some terrestrial project types like fuel break acres don't lend themselves to graphic comparison and are not included in bar graphs. Bar graphs, unless noted, do not show indirect effects as those vary significantly by resource. Indirect effects may far exceed the direct impact of the project.
2. The BLM corporate Riparian Reserve Layer was used to generate road improvement and stream intersects. Acres were calculated based on an assumed 30 foot road right of way within the Riparian Reserve.
3. Acres in LWD projects were based on an assumed 75 foot average width for area influenced by LWD placement in the coast range. In smaller streams in the Cascades, the width influenced is assumed to be 50 feet. In upland volcanics east of the Cascade Crest, this is assumed to be 30 feet. This is intended to reflect a degree of floodplain connectivity in the estimates of affected acres. The influenced length is assumed to be the miles of LWD placed.
4. Acres of Right of Way include construction clearing, Temporary Extra Work Areas (TEWA) and Uncleared Storage Areas (UCSA).

Figure 1--1: Pacific Connector Route

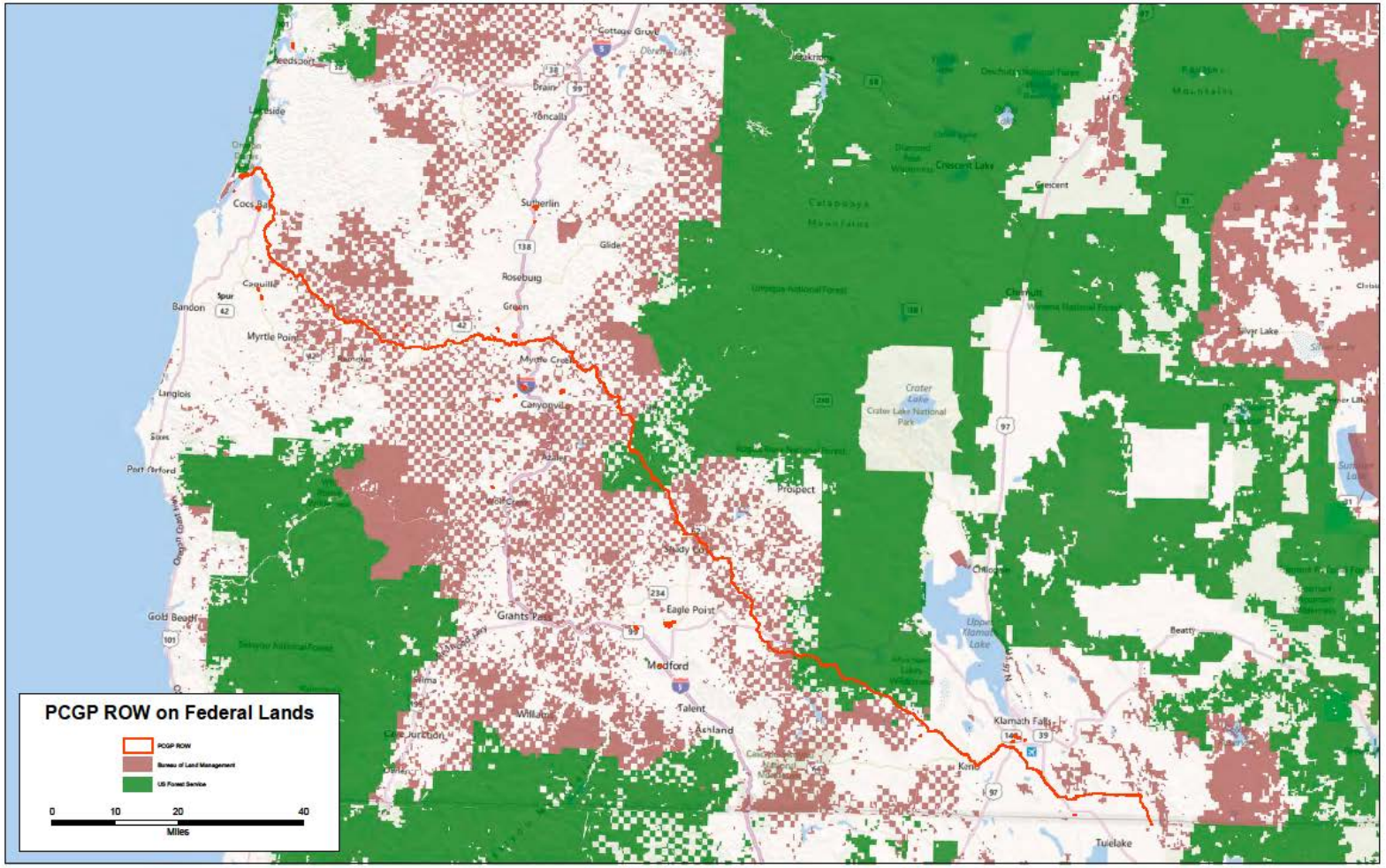


Table 1-1: Miles of PCGP by Watershed and Administrative Unit

Aquatic / Province	River Basin	Watershed	Hydrologic Unit Code	KWS	Total Miles All Owners	CB Miles	RD Miles	MD Miles	LV Miles	BLM Miles	UNF Miles	RRNF Miles	WNF Miles	FS Miles	Total Fed
	South Umpqua	Elk Creek-South Umpqua	1710030204	Yes	3.10	0.00	0.24	0.00	0.00	0.24	2.40	0.00	0.00	2.40	2.64
	South Umpqua	South Umpqua	1710030205	Yes	19.40	0.00	6.23	0.00	0.00	6.23	0.59	0.00	0.00	0.59	6.82
	South Umpqua	Upper Cow Creek	1710030206	No	5.60	0.00	0.00	0.00	0.00	0.00	4.78	0.00	0.00	4.78	4.78
	South Umpqua	MS Umpqua	1710030210	No	13.20	0.00	0.73	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.73
	South Umpqua	Myrtle Creek	1710030211	No	8.40	0.00	3.41	0.00	0.00	3.41	0.00	0.00	0.00	0.00	3.41
	Coquille	Olalla-Lookinglass	1710030212	No	8.70	0.00	1.08	0.00	0.00	1.08	0.00	0.00	0.00	0.00	1.08
	Coos	Coos Bay Frontal	1710030403	No	21.40	0.29	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.29
	Coquille	MF Coquille	1710030501	No	15.50	4.84	2.49	0.00	0.00	7.33	0.00	0.00	0.00	0.00	7.33
	Coquille	EF Coquille	1710030503	No	9.80	2.72	0.00	0.00	0.00	2.72	0.00	0.00	0.00	0.00	2.72
	Coquille	NF Coquille	1710030504	No	8.30	2.84	0.00	0.00	0.00	2.84	0.00	0.00	0.00	0.00	2.84
	Coos	Lower Coquille River	1710030505	No	2.00	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.06
	Upper Rogue	Big Butte Creek	1710030704	No	5.30	0.00	0.00	0.67	0.00	0.67	0.00	0.00	0.00	0.00	0.67

Table 1-1: Miles of PCGP by Watershed and Administrative Unit

Aquatic / Province	River Basin	Watershed	Hydrologic Unit Code	KWS	Total Miles All Owners	CB Miles	RD Miles	MD Miles	LV Miles	BLM Miles	UNF Miles	RRNF Miles	WNF Miles	FS Miles	Total Fed
	Upper Rogue	Trail Creek	1710030706	No	10.60	0.00	0.00	3.88	0.00	3.88	2.09	0.00	0.00	2.09	5.97
	Upper Rogue	Shady Cove RR	1710030707	No	7.50	0.00	0.00	4.42	0.00	4.42	0.00	0.00	0.00	0.00	4.42
	Upper Rogue	Little Butte Creek	1710030708	Yes	32.90	0.00	0.00	5.99	0.00	5.99	0.00	13.66	0.00	13.66	19.65
	Lost River	Lower Lost River	1801020409	No	25.10	0.00	0.00	0.00	0.26	0.26	0.00	0.00	0.00	0.00	0.26
	Upper Klamath	Lake Ewauna	1801020412	No	16.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Upper Klamath	Spencer Creek	1801020601	Yes	15.10	0.00	0.00	0.00	1.04	1.04	0.00	0.00	6.05	6.05	7.09
	Upper Klamath	Boyle Res.	1801020602	No	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total					**233.60**	**10.75**	**14.18**	**14.96**	**1.30**	**41.19**	**9.86**	**13.66**	**6.05**	**29.57**	**70.76**

Source: NSR GIS

Figure 1-2: Miles of Right of Way by Watershed and Administrative Unit

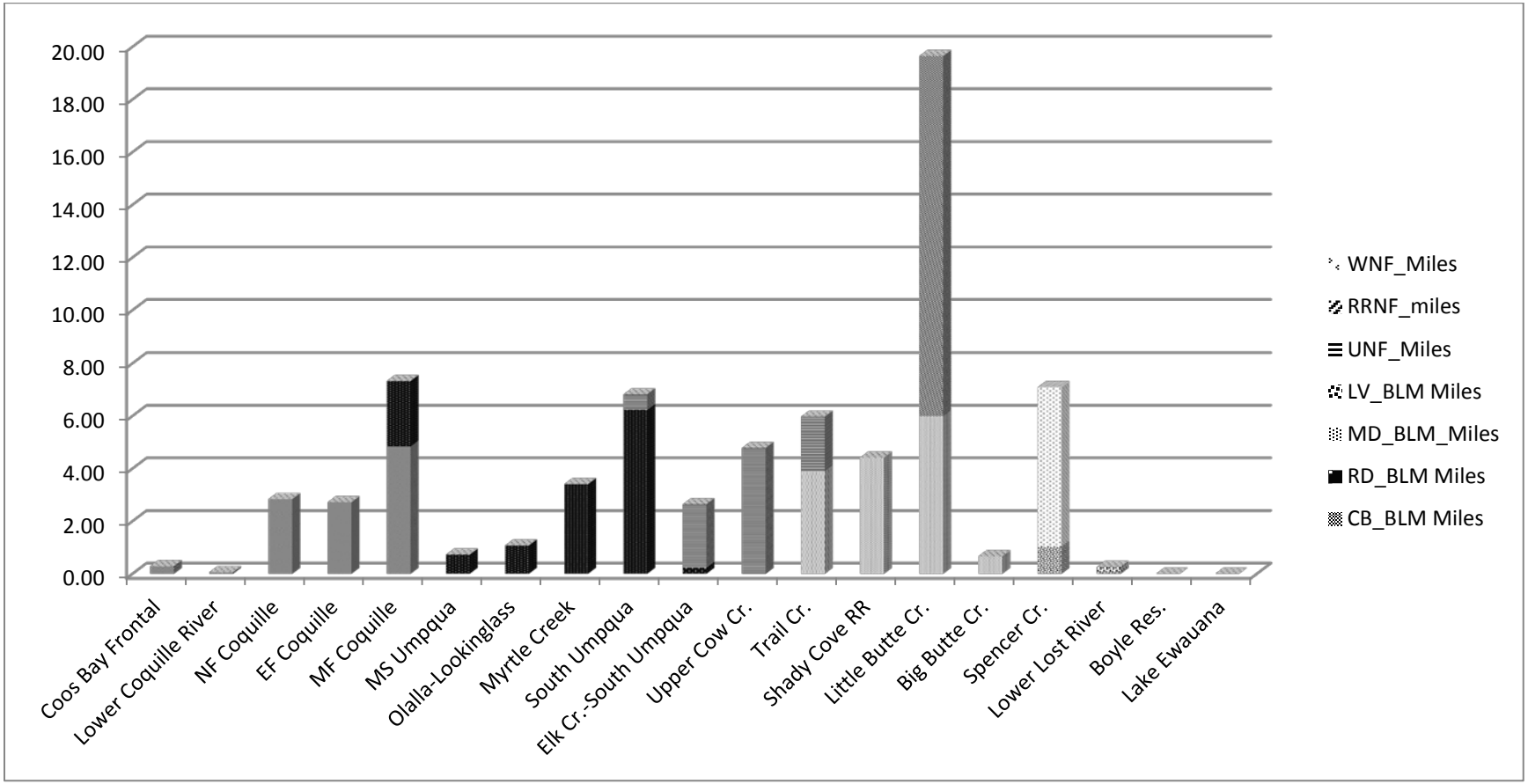
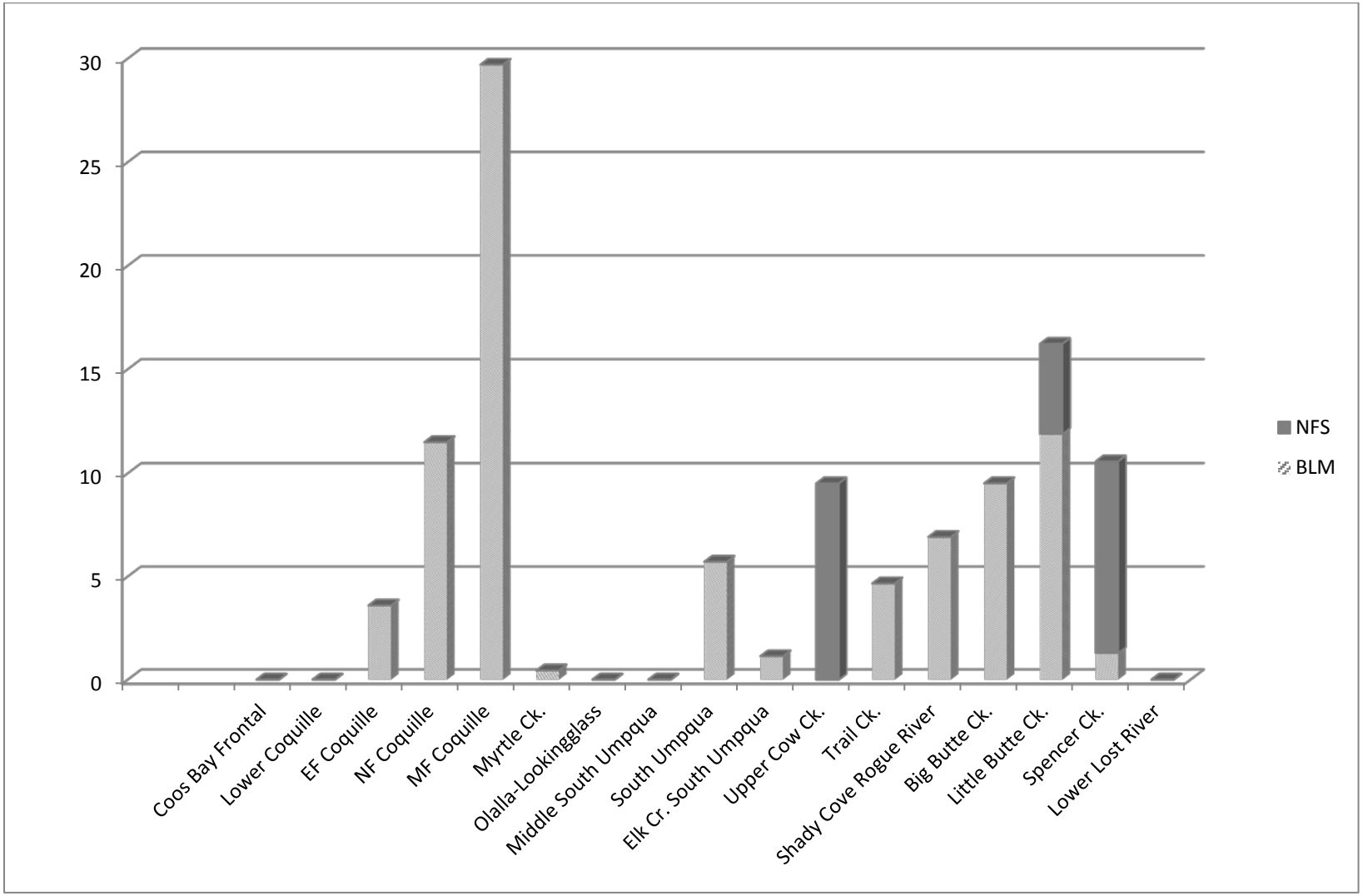


Table 0-2: Acres of Riparian Reserve Within the PCGP Right-of-Way by Watershed and Agency

	Coos Bay Frontal	Lower Coquille	EF Coquille	NF Coquille	MF Coquille	Myrtle Creek	Olalla-Lookinglass	Middle South Umpqua	South Umpqua	Elk Creek South Umpqua	Upper Cow Creek	Trail Creek	Shady Cove Rogue River	Big Butte Creek	Little Butte Creek	Spencer Creek	Lower Lost River	Total
BLM	0	0	3.59	11.5	29.7	0.44	0	0	5.71	1.13	0	4.66	6.91	9.51	11.9	1.29	0	86.34
FS	0	0	0	0	0	0	0	0		0	9.51	0	0	0	4.32	9.28	0	23.11
Total	0	0	3.59	11.5	29.7	0.44	0	0	5.71	1.13	9.51	4.66	6.91	9.51	16.22	10.57	0	109.45

Source: NSR GIS with FERC WWBC Resource Report—(Rerun to show Corridor plus TEWA and UC)

Figure 1-3: Riparian Reserve Acres within Right of Way by Ownership



BLM Fifth Field Watersheds Crossed by the PCGP

Coos Bay Frontal

R/W Miles in Watershed	0.29
R/W Acres in Watershed	4.68
Stream Channels Crossed	0
Riparian Reserve Acres in R/W[1]	0
Late Successional Reserve Acres	0

The PCPG project crosses the Catching Slough subwatershed in the Coos Bay Frontal watershed. No offsite mitigations are anticipated in the Coos Bay Frontal watershed because of the limited extent of the PCGP corridor.

Lower Coquille River

R/W Miles in Watershed	0.06
R/W Acres in Watershed	1.59
Stream Channels Crossed	0
Riparian Reserve Acres in R/W	0
LSR Acres in R/W	0

The PCGP project crosses the Cunningham Creek subwatershed in the Lower Coquille watershed. No offsite mitigations are anticipated in the Coos Bay Frontal watershed because of the limited extent of the PCGP corridor.

North Fork Coquille

R/W Miles in Watershed	2.84			
R/W Acres in Watershed	39.97			
Stream Channels Crossed	Perennial	Intermittent	Wetland	total
	1	5	2	8
Riparian Reserve Acres in R/W	11.5			
Designated LSR Acres in R/W	0			
Unmapped MAMU LSR Acres in R/W	0			

The PCGP crosses portions of the Middle Creek and Hudson Creek subwatersheds in the North Fork Coquille watershed.

Aquatic Conditions and Issues

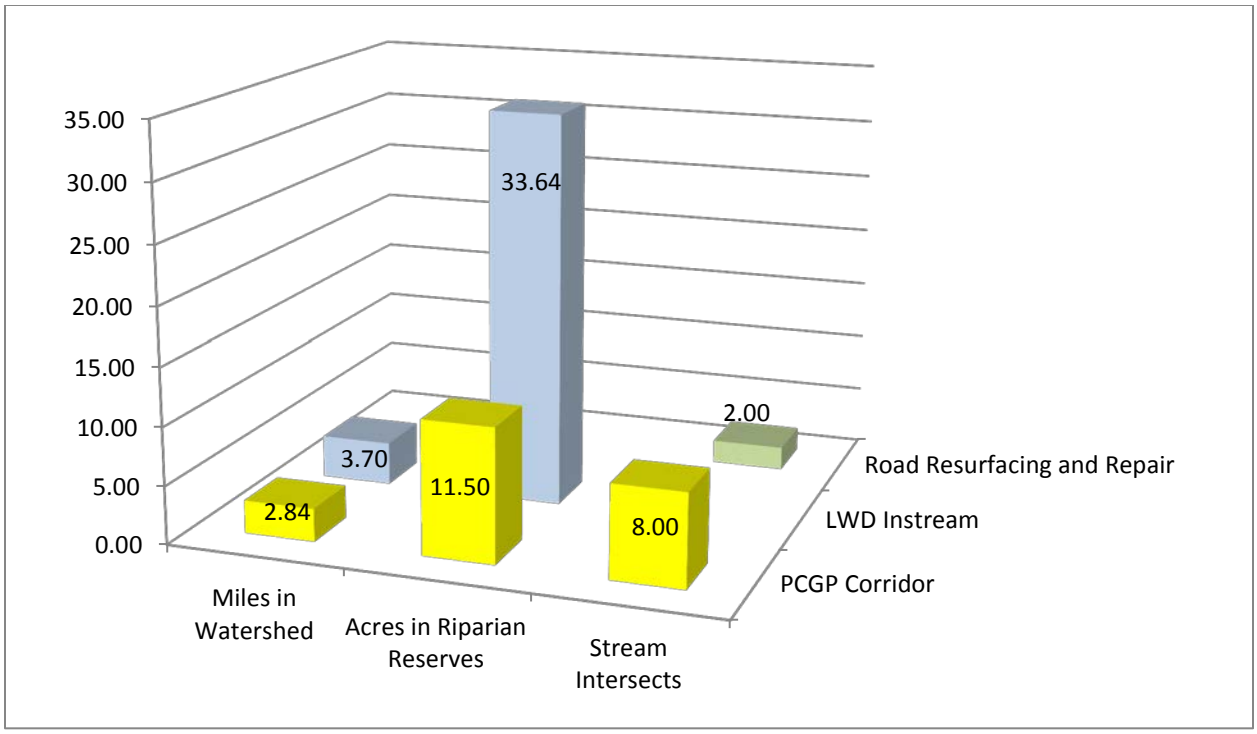
- NF Coquille is 303 (d) listed for temperatures and sediment.
- NF Coquille is "At Risk" or "Not Properly Functioning for multiple watershed indicators including temperature, spawning gravel, summer and winter rearing habitat, large wood, channel modification, .
- NF Coquille is within the range of anadromy for coho salmon.
- High road densities and road-related sediment have negatively impacted aquatic habitats.
- Disturbed soils are susceptible to significant surface erosion during heavy rainfall events
- Rapid runoff may occur because of shallow soils and limited water storage capacity.
- Loss of pool habitat for over wintering juvenile salmonids is determined to be a major limiting factor.
- Upland fine sediment sources are limiting aquatic habitat condition.

Terrestrial Conditions and Issues

- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Early and mid-seral plant communities have increased and late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
LWD instream	Aquatic Habitat	Steinnon Creek In-stream Large Wood Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves, associated aquatic and riparian habitat, and contributes to the accomplishment of ACS objectives.	1.5	miles	$128,157
LWD instream	Aquatic Habitat	Upper North Fork Coquille In-stream Large Wood Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves, associated aquatic and riparian habitat, and contributes to the accomplishment of ACS objectives.	2.2	miles	$270,958
Road Surfacing	Road Sediment Reduction	Bridge Approach paving - Woodward & Alder Creek Roads	Road-related sediment has negatively impacted the NF Coquille. While BMPs will be implemented, construction of the PCPG will likely cause sediment to enter stream channels and may affect aquatic habitat. Surfacing the bridge approach would reduce if not eliminate sediment input to coho, steelhead, and cutthroat habitat.	2	ea.	$43,623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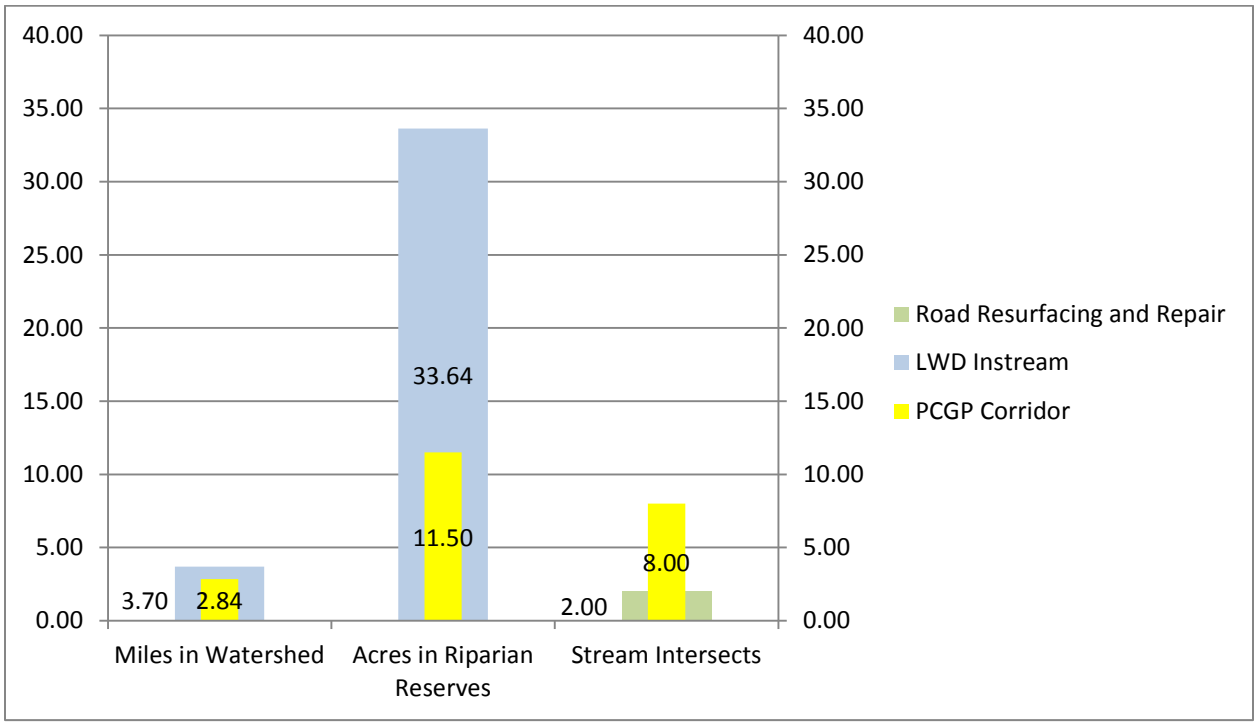
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing and Repair
LWD Instream
PCGP Corridor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Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing and Repair
LWD Instream
PCGP Corridor

East Fork Coquille

R/W Miles in Watershed	2.72
R/W Acres in Watershed	45.87
Stream Channels Crossed	2 Intermittent
Riparian Reserve Acres in R/W	3.59
Designated LSR Acres in R/W	6.25
Unmapped MAMU Acres in R/W	12.91 (See LSR-Matrix discussion)

The PCGP project crosses portions of the Elk Creek, Brewster Canyon and Yankee Run subwatersheds on BLM lands in the East Fork Coquille watershed.

Aquatic Conditions and Issues:

- Mainstem is 303(d) listed for temperatures but summer temperatures in the upper watershed above Camas Creek meet the temperature standards.
- EF Coquille is "At Risk" or "Not Properly Functioning for multiple watershed indicators.
- EF Coquille is within the range of anadromy for coho salmon.
- High road densities and road-related sediment have negatively impacted aquatic habitats. There is an over-abundance of fine sediments in Weekly, **Yankee Run**, Dead Horse and Knepper Creeks. Weekly**, Elk, Yankee Run** and lower Steel Creeks are deficient in large wood.
- Disturbed soils are susceptible to surface erosion during rainfall events
- Rapid runoff may occur because of shallow soils and limited water storage capacity
- Loss of pool habitat for over wintering juvenile salmonids is a major limiting factor.

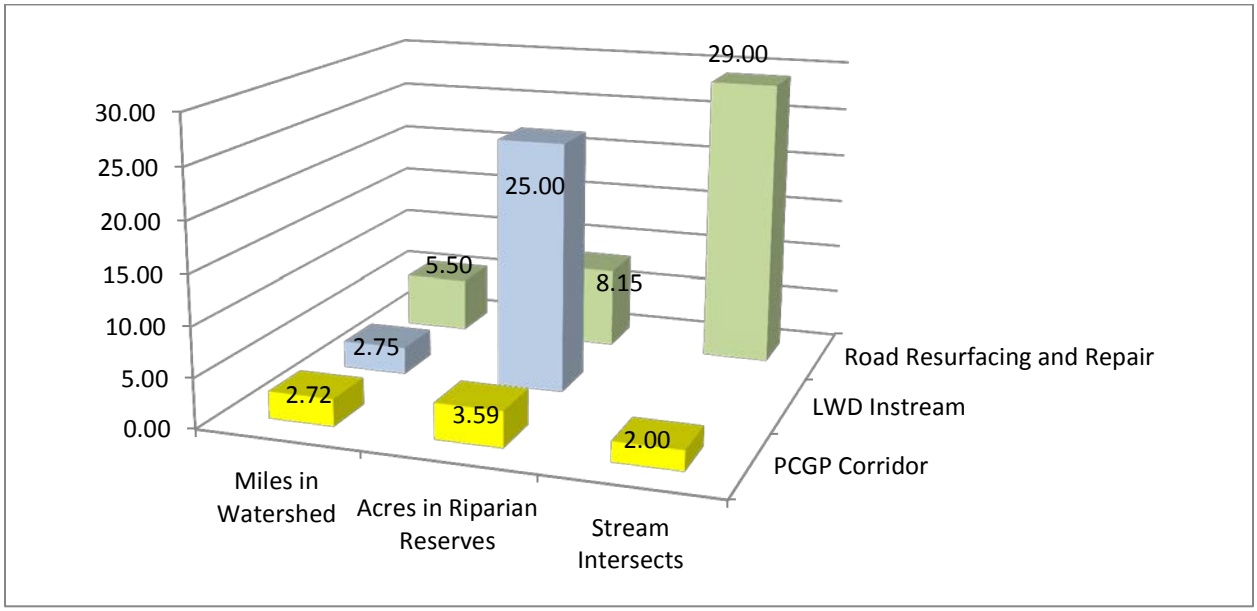
Terrestrial Conditions and Issues

- Fragmentation from past logging has substantially impacted terrestrial habitats
- The EF Coquille provides substantial MAMU habitat.
- Fire and windthrow have greatest potential impacts on marbled murrelet habitats.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Qty.	Unit	CostWithOH
Road Surfacing	Road Sediment Reduction	Road Surfacing – South Fork Elk Creek	Road-related sediment has negatively affected the EF Coquille. The effects of the PCGP are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed. Surfacing the BLM road which is parallel to the South Fork Elk Creek would reduce if not eliminate sediment input to adjacent Chinook, coho, steelhead, and cutthroat habitat.	2.6	miles	$1,038,170
Road Surfacing	Road Sediment Reduction	Road Surfacing – Yankee Run Mainline	Road-related sediment has negatively impacted the EF Coquille. The effects of the PCGP are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed. Surfacing the BLM road which is parallel to Yankee Run Creek would reduce if not eliminate road-related sediment input to coho, steelhead, and cutthroat habitat.	2	miles	$785,332
Road Surfacing	Road Sediment Reduction	Road Surfacing – Yankee Run Spurs	Road-related sediment has negatively impacted the EF Coquille. The effects of the PCGP are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed. Surfacing the BLM road which is parallel to Yankee Run Creek would reduce if not eliminate road – related sediment input to coho, steelhead, and cutthroat habitat.	0.9	miles	$410,999
LWD instream	Aquatic Habitat	Yankee Run In-stream Large Wood Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves, associated aquatic and riparian habitat, and contributes to the accomplishment of ACS objectives.	2.75	miles	$261,296

Fire Suppression	Fire suppression	Heli-Pond construction	High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP. Construction of the pipeline and associated activities removes both mature and developing stands and will increase fire suppression complexity; however, the corridor also provides a fuel break. Within the East/Middle Fork watersheds, there is an 18+ mile gap between helicopter accessible waterholes. Quick response time is imperative for successful control in wildfire situations during initial attack. Most water sources in this area are low in the drainage and accessible only by truck. Heliponds at these locations would enable a 2-3 mile radius for aerial application. Fire control is necessary to protect Late Successional Reserves and endangered species habitat should a wildfire occur.	2	ea.	$259,380
Land Re-Allocation from Matrix to LSR Non-Federal Land Acquisition	Acquisition	LSR Reallocation& Land Acquisition	This action contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the PCGP. The action also compensates for the removal of occupied marbled murrelet habitat and suitable RNF spotted owl habitat. In addition, the selected parcel reduces the potential edge effects caused by management of Matrix lands adjacent to occupied murrelet sites by reallocating the entire parcel to LSR.	120	acres	$0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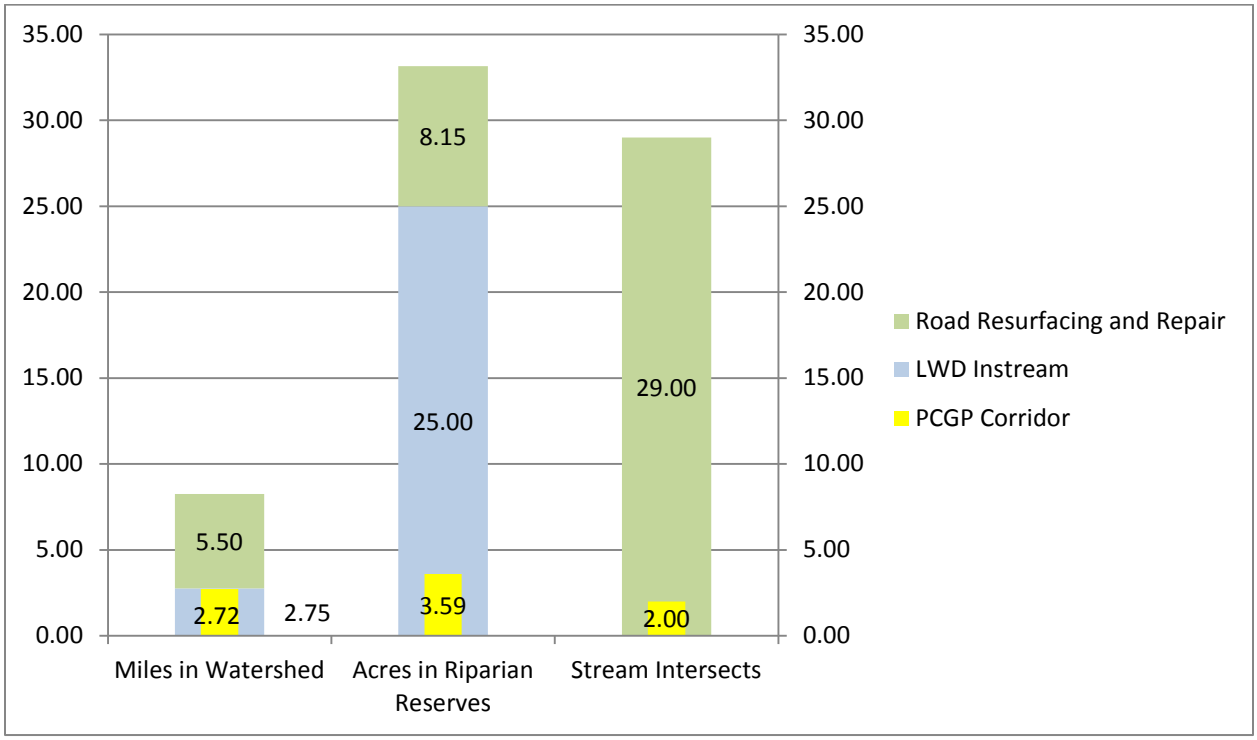
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing and Repair
LWD Instream
PCGP Corridor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Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing and Repair
LWD Instream
PCGP Corridor

Middle Fork Coquille

R/W Miles in Watershed	7.34		
R/W Acres in Watershed	142.47		
Stream Channels Crossed	Perennial	Intermittent	total
	2	7	9
Riparian Reserve Acres in R/W	29.72		
Designated LSR Acres in R/W	50.88		
Unmapped MAMU LSR Acres in R/W	22.73 (See LSR-Matrix discussion)		

The PCGP project crosses portions of the Headwaters MF Coquille, Upper Rock Creek, Sandy Creek, Camas Creek, and Big Creek subwatersheds on BLM lands in the Middle Fork Coquille watershed.

Aquatic Conditions and Issues

- MF Coquille is "At Risk" or "Not Properly Functioning for multiple watershed indicators including temperature, spawning gravel, summer and winter rearing habitat, large wood, channel modification, .
- MF Coquille is within the range of anadromy for coho salmon.
- High road densities and road-related sediment have negatively impacted aquatic habitats.
- In general, the basin has a deficit of in-stream structure and channel complexity.
- Disturbed soils are susceptible to significant surface erosion during heavy rainfall events
- Rapid runoff may occur because of shallow soils and limited water storage capacity.
- Loss of pool habitat for over wintering juvenile salmonids is determined to be a major limiting factor.
- Upland fine sediment sources are limiting aquatic habitat condition.
- Replacing fish passage barriers with "fish friendly" passages, placement of LWD in appropriate stream reaches and reducing road sediment are key restoration recommendations.

Terrestrial Conditions and Issues

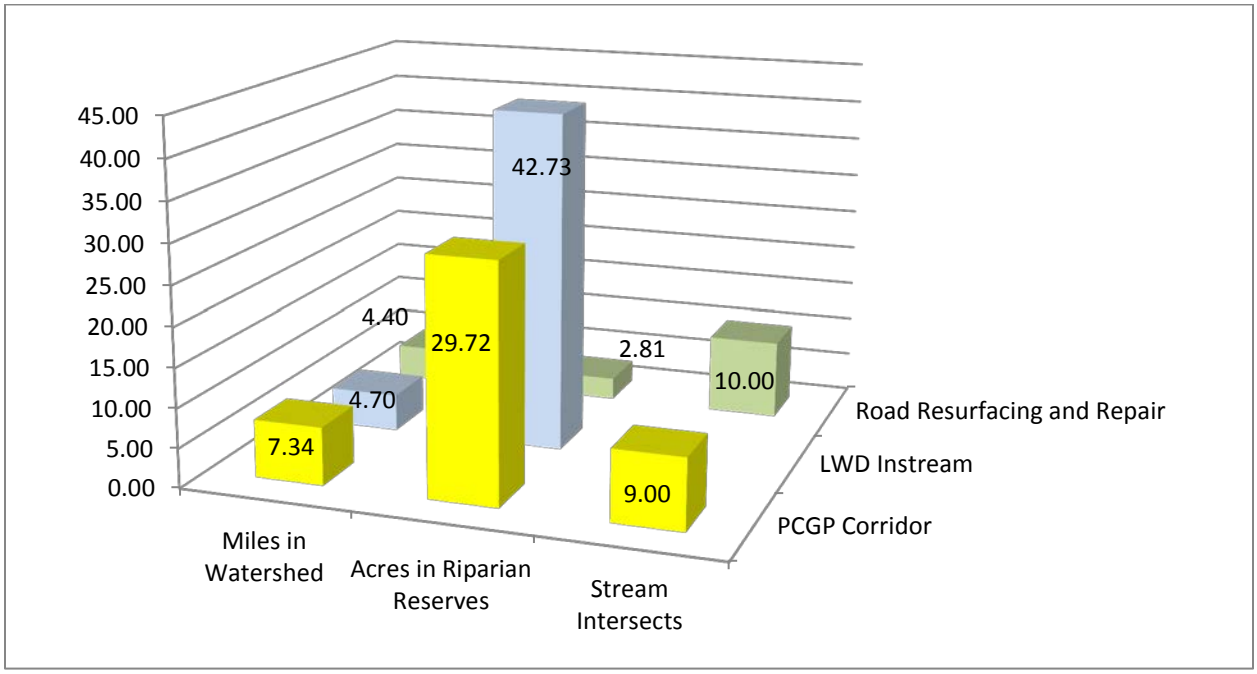
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Early and mid-seral plant communities have increased and late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Fire Suppression	Fire suppression	Heli-Pond construction	High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP. Construction of the pipeline and associated activities removes both mature and developing stands and will increase fire suppression complexity; however the corridor also provides a fuel break. Within the East/Middle Fork watersheds, there is an 18+ mile gap between helicopter accessible waterholes. Quick response time is imperative for successful control in wildfire situations during initial attack. Most water sources in this area are low in the drainage and accessible only by truck. Heliponds at these locations would enable a 2-3 mile radius for aerial application. Fire control is necessary to protect Late Successional Reserves and endangered species habitat should a wildfire occur.	1	ea.	$129,690
Fish Passage	Fish Passage	Loveseat Creek culvert removal	Man-made barriers to fish passage have negatively affected access to habitat in the MF Coquille. The stream crossing is a fish barrier to resident fish. Removing the culvert and associated road fill will extend the availability of upstream habitat, mitigating for reductions in habitat quality on stream reaches crossed by the pipeline corridor. Sediment introductions to the stream network would also cease.	1	project	$23,580
Land Re-Allocation from Matrix to LSR Non-Federal Land Acquisition	Acquisition	LSR Reallocation& Land Acquisition	This action contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the PCGP. The action also compensates for the removal of occupied marbled murrelet habitat and suitable RNF spotted owl habitat. In addition, the selected parcel reduces the potential edge effects caused by management of Matrix lands adjacent to occupied murrelet sites by reallocating the entire parcel to LSR.	330	acres	$0

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
LWD instream	Aquatic Habitat	Twelvemile Creek Large Wood and Boulder Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. There are approximately 7.3 miles of corridor and 9 stream crossings in the MF Coquille. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2	miles	$172,134
LWD instream	Aquatic Habitat	Upper Rock Creek In-stream Large Wood Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. There are approximately 7.3 miles of corridor and 9 stream crossings in the MF Coquille. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.1	miles	$222,843
LWD instream	Aquatic Habitat	Middle Fork Coquille LWD Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. There are approximately 7.3 miles of corridor and 9 stream crossings in the MF Coquille. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat.	0.6	miles	$64,845

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Road Drainage and Surface Enhancement	Road Sediment Reduction	Camas Mountain Road Drainage and Surface Enhancement	Road-related sediment and stream network extension from ditchlines have negatively impacted the MF Coquille. There are approximately 7.3 miles of corridor and 9 stream crossings in the MF Coquille. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Roads do not meet current BMPs and are a source of chronic sediment delivery to fish bearing streams. The 9.1 and 9.2 roads currently show signs of water rutting and stream network extension. Stormproofing and blocking the road will reduce the potential for sediment-laden water to be carried off the road surface and into the ditch where it could be transmitted to the stream network.	3.5	miles	$337,194
Road Surfacing	Road Sediment Reduction	Road Surfacing -Fall Creek System	Road-related sediment has negatively impacted the MF Coquille. There are approximately 7.3 miles of corridor and 9 stream crossings in the MF Coquille. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Surfacing the BLM road which is parallel to Fall Creek would reduce if not eliminate sediment input to coho, steelhead, and cutthroat habitat.	0.9	miles	$347,574
Road Surfacing	Road Sediment Reduction	Bridge Approach paving -Sandy & Jones Creek Roads	Road-related sediment has negatively impacted the MF Coquille. There are approximately 7.3 miles of corridor and 9 stream crossings in the MF Coquille. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Surfacing the bridge approach would reduce if not eliminate sediment input to coho, steelhead, and cutthroat habitat from this location.	2	ea	$43,623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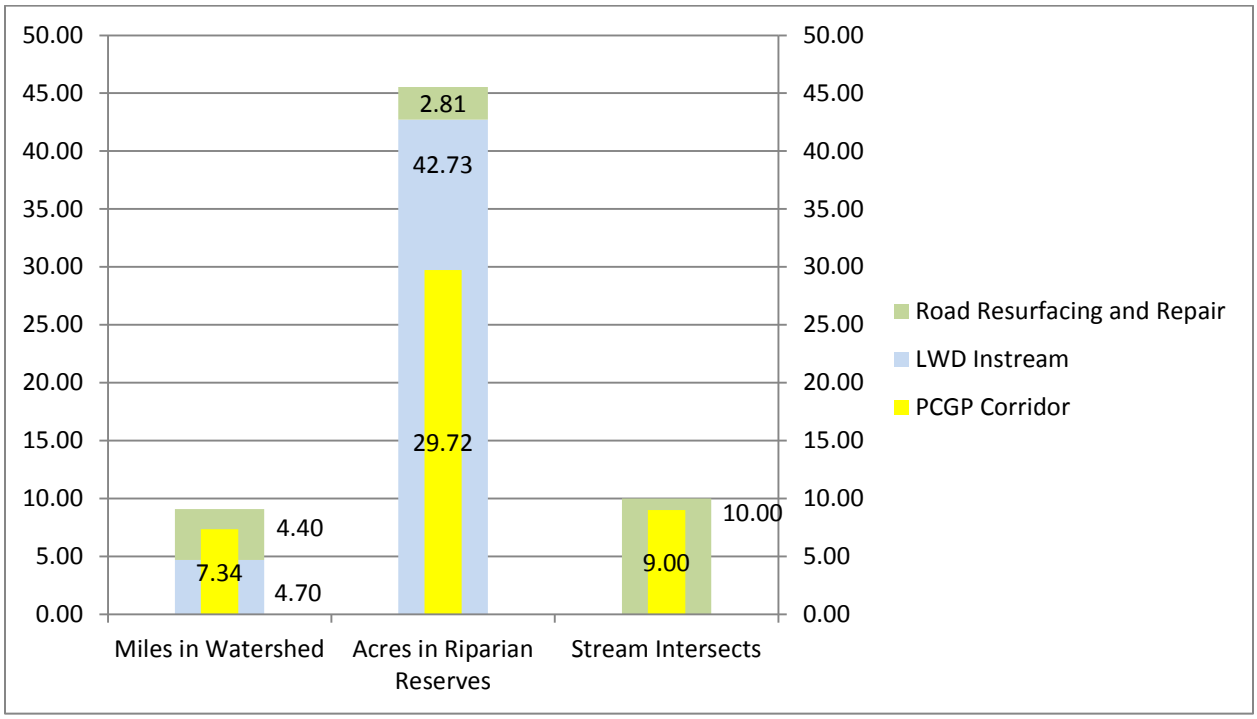
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing and Repair
LWD Instream
PCGP Corridor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Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing and Repair
LWD Instream
PCGP Corridor

Olalla Lookingglass

R/W Miles in Watershed	1.08
R/W Acres in Watershed	21.75
Stream Channels Crossed	0
Riparian Reserves Acres ion R/W	0
Designated LSR Acres in R/W	4.24
KOAC Acres in R/W	2.51

The PCPG crosses portions of the Tenmile Creek, Berry Creek and Olalla Creek on BLM lands in the Olalla-Lookingglass watershed.

Aquatic Conditions and Issues

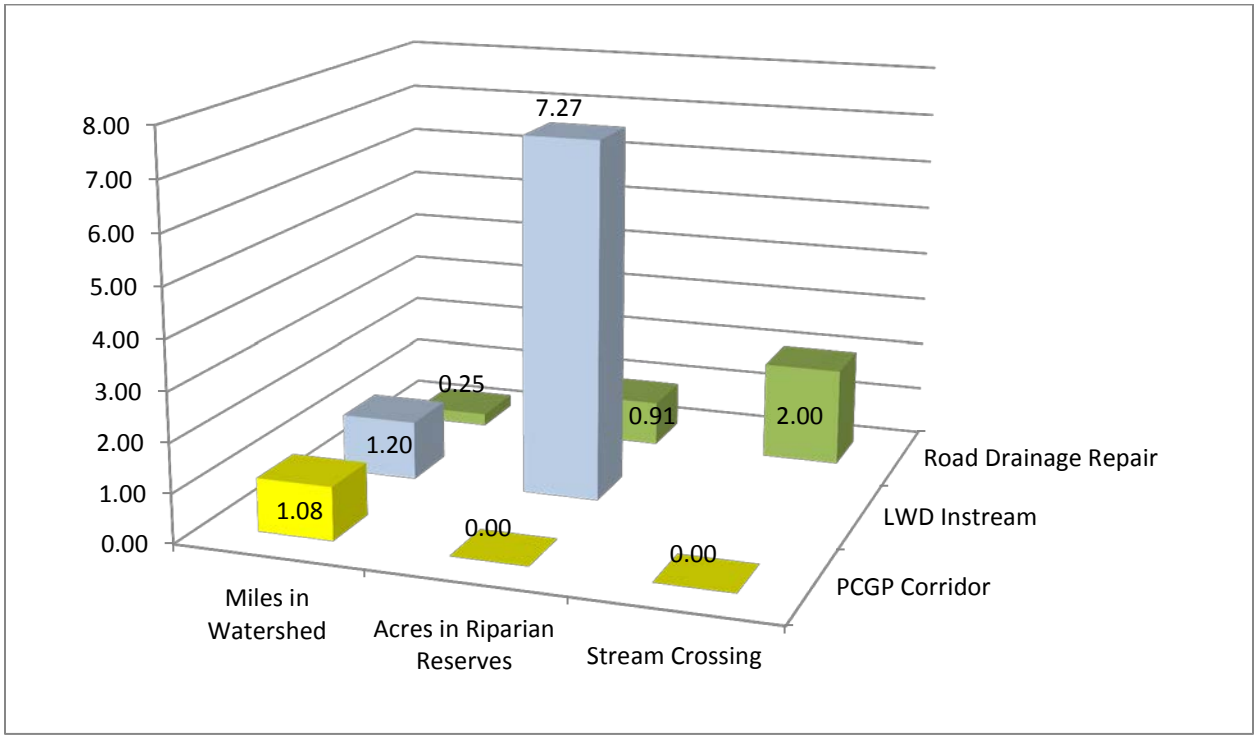
- High road densities, large numbers of stream crossings and cumulative effects of timber harvest have increased sediment and likely peak flows.
- Water quality issues include high temperatures, low flows, low dissolved oxygen and sediment issues
- Olalla Lookingglass watershed is within the range of anadromy for coho salmon.
- Road improvements that reduce road-related sediment would contribute to improving aquatic conditions in the watershed.

Terrestrial Conditions and Issues

- There are 37 spotted owl sites within the WAU. Thirty-two spotted owl sites are on BLM Administered Land. Seven spotted owl sites on BLM administered lands are protected with 100 acre activity centers (core areas).
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Early and mid-seral plant communities have increased and late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Land Re-Allocation from Matrix to LSR Non-Federal Land Acquisition	Acquisition	LSR Reallocation and Land Acquisition	This action contributes to the "neutral to beneficial" standard for new developments in LSRs by adding acres to the LSR land allocation to offset the long-term loss of acres of acres and habitat from the construction and operation of the PCGP. In addition to impacts to Mapped LSR, this action compensates for impacts to 3 unmapped LSRs (NSO habitat). The 409 acres of re-allocation would be a factor of 5.0 x to the 81 acres of habitat affected by the construction.	409	acres	$0
LWD instream	Aquatic Habitat	Olalla Creek Large Wood and Boulder Placement	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves, associated aquatic and riparian habitat, and contributes to the accomplishment of ACS objectives.	1.2	miles	$126,389
Road Stabilization	Road Sediment Reduction	Olalla Tie Road Renovation	Sediment from roads is a primary concern in Olalla-Lookinglass Creek Roads do not meet current BMPs and are a source of chronic sediment delivery to fish bearing streams. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Additionally, there are several landslides crossing the road which need to be stabilized. Stabilizing these conditions would reduce the delivery of road-related sediments to channels.	1	project	$294,750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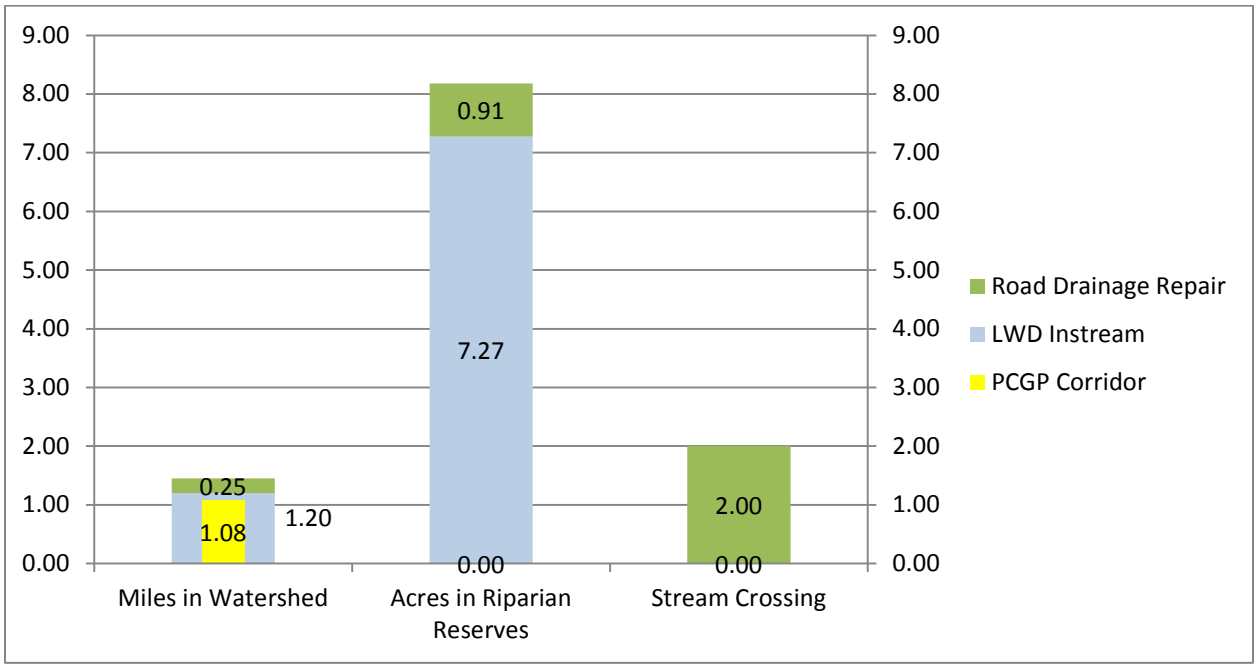
Road Drainage Repair
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Crossing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Road Drainage Repair
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Crossing

Middle South Umpqua

R/W Miles in Watershed	0.79
R/W Acres in Watershed	15.79
Stream Channels Crossed	0
Riparian Reserve Acres in R/W	0
Late Successional Reserve Acres	0

The PCGP project crosses portions of the Rice Creek subwatershed in the Middle South Umpqua watershed.

Aquatic Conditions and Issues

- Middle South Umpqua watershed is "At Risk" or "Not Properly Functioning for multiple watershed indicators including temperature, spawning gravel, summer and winter rearing habitat, large wood, and channel modification.
- Middle South Umpqua watershed is within the range of anadromy for coho salmon.
- High road densities and road-related sediment have negatively impacted aquatic habitats.
- In general, the watershed has a deficit of in-stream structure and channel complexity.
- Replacing fish passage barriers with "fish friendly" passages and reducing road sediment are key restoration recommendations.

Terrestrial Conditions and Issues

- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Early and mid-seral plant communities have increased and late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Fish Passage	Fish Passage	Rice Creek culvert replacements	Man-made barriers to fish passage have negatively affected access to habitat in the MS Umpqua. Replacing fish barrier culverts with crossings that pass adult and juvenile salmonids at a range of flows will extend the availability of upstream habitat, mitigating for reductions in habitat quality on stream reaches crossed by the pipeline corridor. In addition, culverts are at risk of failure due to small size and age. This could result in the culvert plugging which could cause road fill to enter the stream network. Replacing fish barrier culverts with crossings that pass adult and juvenile salmonids at a range of flows will extend the availability of upstream habitat, mitigating for reductions in habitat quality on stream reaches crossed by the pipeline corridor. In addition, culverts are at risk of failure due to small size and age. This could result in the culvert plugging which could cause road fill to enter the stream network.	2	sites	$265,275
Road Drainage	Road Sediment Reduction	East Fork Willis Creek tributary culvert replacement	Sediment is one of the primary water quality problems in the MS Umpqua. Watershed analyses clearly indicate that the sediment turbidity habitat indicator is at risk or more likely not functioning properly. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Culvert is plugged, old, undersized, shot-gunned, and eroding road fill. Culvert has poor alignment with the stream at the outlet. Replacing the culvert with a properly sized one will reduce the risk of road fill failure.	1	project	$56,592
Road Drainage	Road Sediment Reduction	Judd Creek culvert removal	Sediment is one of the primary water quality problems in the MS Umpqua. Watershed analyses clearly indicate that the sediment turbidity habitat indicator is at risk or more likely not functioning properly. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. This culvert is undersized and has a large amount of road fill associated with it. Pulling the culvert and fill material and stormproofing the road would prevent a plugged culvert. A plugged culvert could cause the road fill to fail which could deliver sediment downstream to fish bearing reaches. The road is blocked by a landslide just beyond so access would not be lost. Access to the stream crossing is gradually being lost due to soil slumping and vegetation growth.	1	project	$68,382

Myrtle Creek

R/W Miles in Watershed	3.41
R/W Acres in Watershed	114.44
Stream Channels Crossed	0
Riparian Reserve Acres in R/W	0.44
Designated LSR Acres in R/W	0
KOAC Acres in R/W	4.77

The PCGP crosses portions of the Lower South Myrtle and Lower North Myrtle subwatersheds on BLM lands in the Myrtle Creek watershed.

Aquatic Conditions and Issues

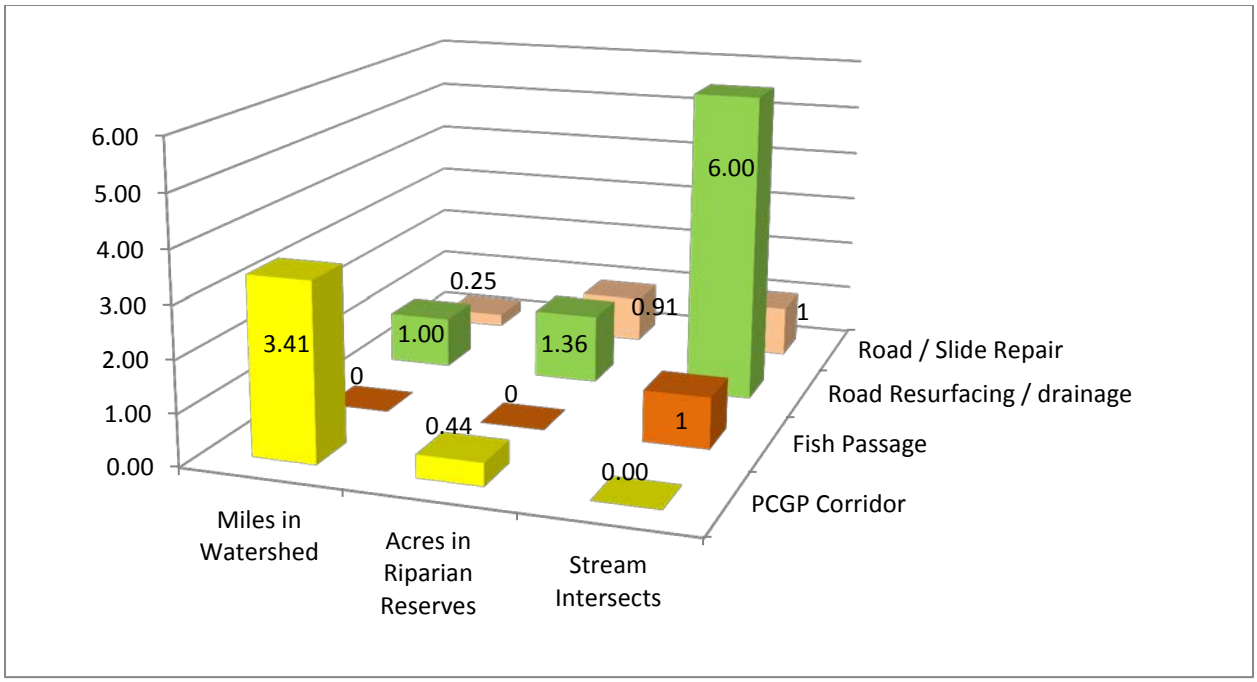
- North Myrtle Creek is on the water quality limited list for habitat modification. South Myrtle Creek and Riser Creek are on the water quality limited list for temperature. South Myrtle Creek (from the mouth to Weaver Creek) is on the water quality limited list for flow modification.
- Sediment in the streams, poor width to depth ratios, and the lack of large woody debris and pools are some of the limiting factors reported in the stream surveys conducted by ODFW.
- High road densities and road-related sediment have negatively impacted aquatic habitats. Road densities on BLM-administered land range from zero to 6.82 miles per square mile. The average road density on BLM-administered land in the WAU is 3.85 miles per square mile.

Terrestrial Conditions and Issues

- The Watershed Analysis documented 23 known spotted owl centers in the Myrtle Creek WAU.
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Early and mid-seral plant communities have increased and late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Offsite Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Fish Passage	Fish Passage	Slide Creek culvert replacement	Man-made barriers to fish passage have negatively affected access to habitat in Myrtle Creek Culvert is perched, undersized, and a fish barrier for anadromous and resident fish. Replacing a fish barrier culvert with one that will pass adult and juvenile salmonids at a range of flows will extend the availability of upstream habitat, mitigating for reductions in habitat quality on stream reaches crossed by the pipeline corridor. In addition, undersized culverts are at risk of failure due to small size and age. This could result in the culvert plugging which could cause road fill to enter into the stream network.	1	project	$142,659
Road Stabilization	Road Sediment Reduction	South Myrtle Hill Slide Repair	Sediment in streams is a limiting factor in Myrtle Creek. There are approximately 3.4 miles of corridor in Myrtle Creek. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Stabilizing the failure will prevent future sediment delivery and catastrophic slope failure.	1	project	$271,170
Road Drainage and Surface Enhancement	Road Sediment Reduction	Ben Branch Road Drainage and Surface Enhancement	Sediment in streams is a limiting factor in Myrtle Creek. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Roads do not meet current BMPs and are a source of chronic sediment delivery to fish bearing streams. Surfacing and drainage repair would reduce sediment delivery to fish bearing streams.	1	miles	$86,657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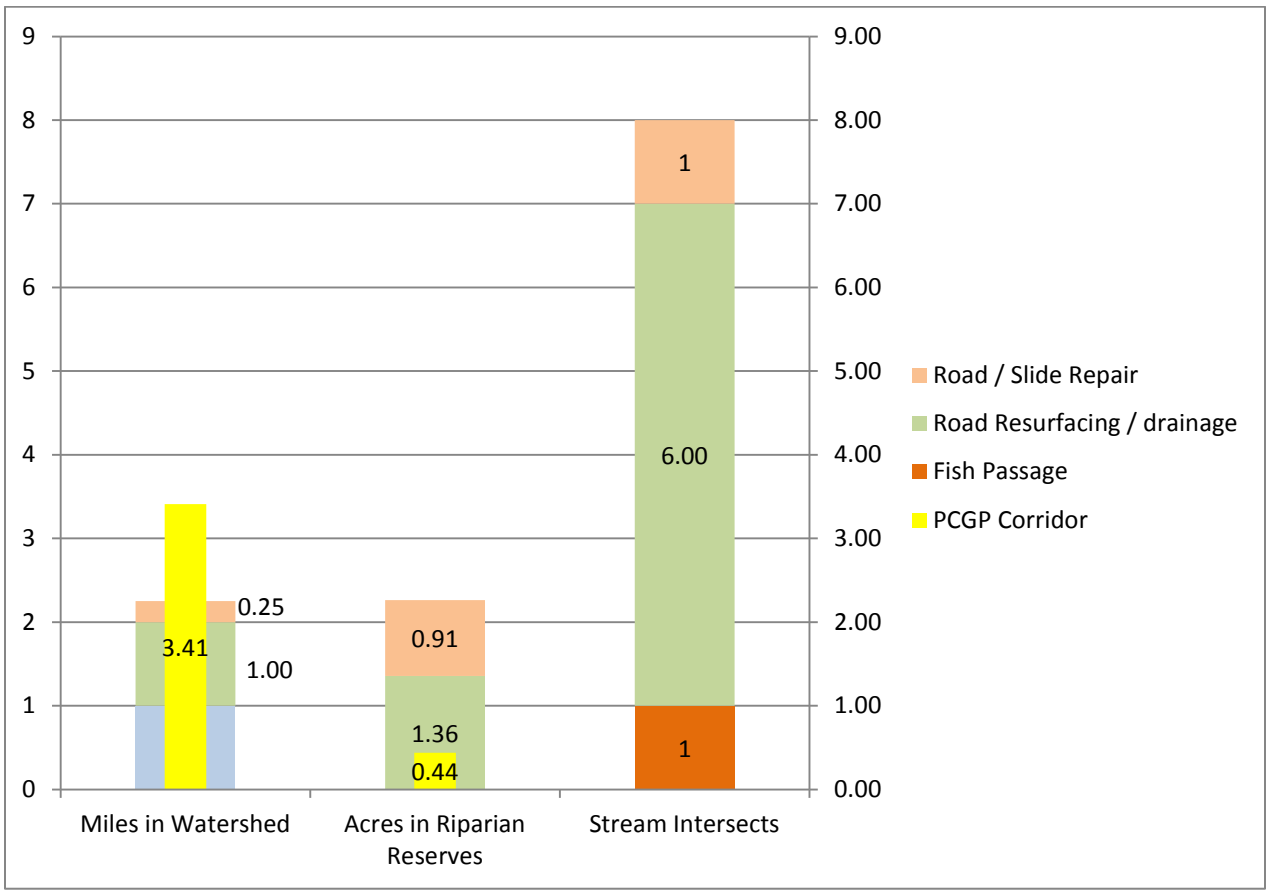
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road / Slide Repair
Road Resurfacing / drainage
Fish Passage
PCGP Corridor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Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road / Slide Repair
Road Resurfacing / drainage
Fish Passage
PCGP Corridor

South Umpqua (Tier One Key Watershed)

R/W Miles in Watershed	6.25		
R/W Acres in Watershed	183.51		
Stream Channels Crossed	Intermittent	Wetland	total
	1	2	3
Riparian Reserve Acres in R/W	5.71		
Designated LSR Acres in R/W	59.96		
KOAC Acres in R/W	9.85		

The PCPG project crosses parts of the Days Creek., St. John Creek, Stouts Creek, and Corn Creek subwatersheds on BLM lands in the South Umpqua Watershed.

Aquatic Conditions and Issues

- Beals Creek, **Days Creek**, and Shively Creek were on the water quality limited list for habitat modification. Fate Creek, **Stouts Creek, and the East Fork of Stouts Creek** were on the water quality limited list for temperature. The South Umpqua River through portions of the WAU was on the water quality limited list due to toxics, flow modification, aquatic weeds or algae, bacteria, biological criteria, dissolved oxygen, sediment, pH, and temperature.
- High road densities and road-related sediment have negatively impacted aquatic habitats. Road densities on BLM-administered land range from 0.93 to 5.58 miles per square mile. The average road density on BLM-administered land in the WAU is 3.60 miles per square mile.
- Three stream reaches surveyed in the Aquatic Habitat Inventory were rated as being in good condition, 57 stream reaches were rated as being in fair condition, and 22 stream reaches were rated as being in poor condition.
- Restoration recommendations include reducing road – related sediment sources, adding LWD to stream courses, and providing fish passage.

Terrestrial Conditions and Issues

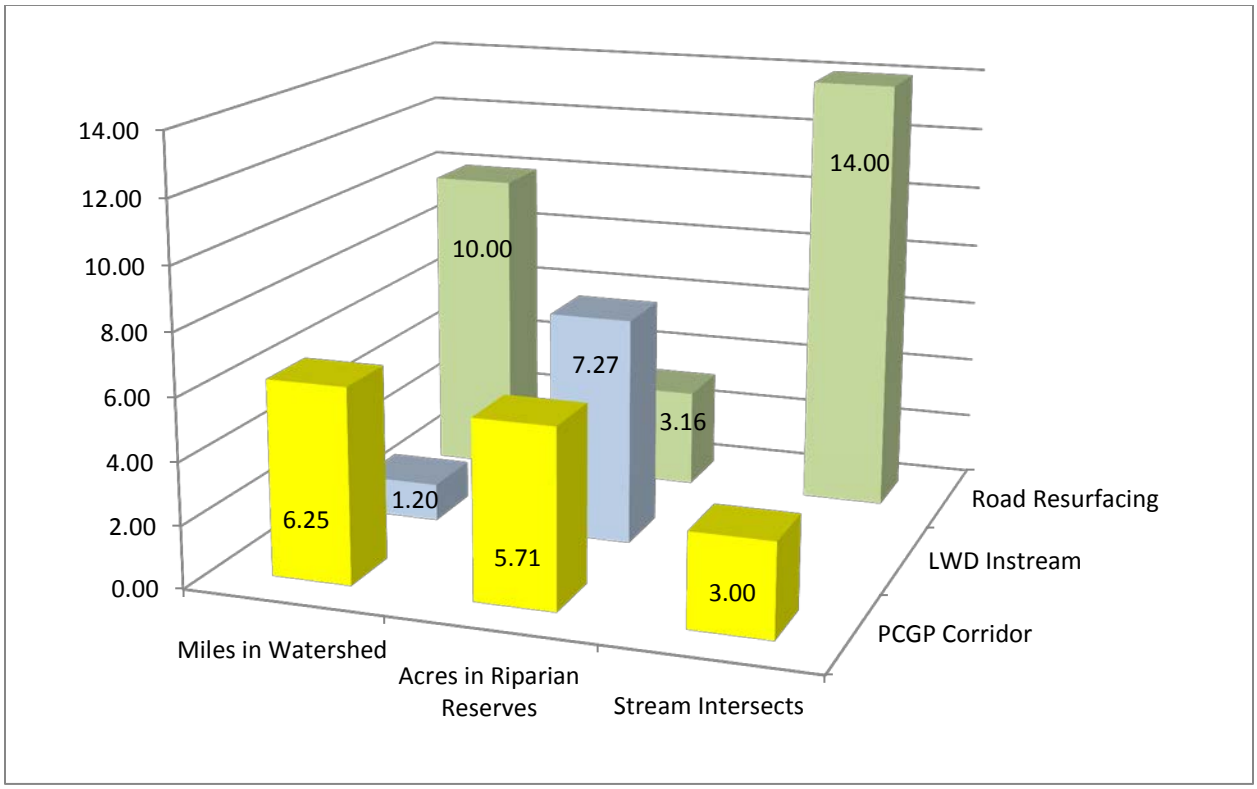
- The South Umpqua WA noted there are 79 known spotted owl centers in the South Umpqua WAU representing nest locations for 50 northern spotted owl pairs.
- WA Restoration recommendations include stand density management to accelerate development of LSOG habitats. LSRA recommendations include fuels reductions to reduce the risk of stand-replacement fire.

Proposed Offsite Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Fire Suppression	Fire suppression	Dry Hydrants	By installing dry hydrants, the water source is disturbed one time but there are several advantages. Fire vehicles will not need to be really close to the water to fill, decreasing risk of contamination, and they can fill out of some water sources that would otherwise need to be modified for use. Areas that have had restoration work for fish populations could still be safely accessed for fire suppression. Over all, better water sources will improve suppression success and therefore help protect natural resources.	6	sites	$19,571
Fish Passage	Fish Passage	Beal Creek culvert replacement	Man-made barriers to fish passage have negatively affected access to habitat in the South Umpqua. Both culverts are undersized and obstruct anadromous and resident fish passage. Replacing the culverts with ones properly sized for the stream will allow for proper fish passage along with reducing the risk for culverts plugging and causing road fill failures.	2	sites	$236,979
Fuels Reduction	Stand Density Fuel Break	Hazardous Fuel Reduction	High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP. Construction of the pipeline and associated activities removes both mature and developing stands and will increase fire suppression complexity; however, the corridor also provides a fuel break. Fuels reduction adjacent to the corridor will increase the effectiveness of the corridor as a fuel break. Fuels reduction will lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Days Creek to Shady Cove fuel break and ties in with similar projects on the Umpqua NF.	1000	acres	$1,196,685

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
LWD instream	Aquatic Habitat	West Fork Canyon Creek Large Wood and Boulder Placement	The South Umpqua River is a Tier 1 Key Watershed. Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. There are approximately 6.23 miles of corridor and 3 stream crossings in the South Umpqua. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves, associated aquatic and riparian habitat, and contributes to the accomplishment of ACS objectives.	0.8	miles	$85,831
LWD instream	Aquatic Habitat	Days Creek Large Wood and Boulder Placement	The South Umpqua River is a Tier 1 Key Watershed. Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. There are approximately 6.23 miles of corridor and 3 stream crossings in the South Umpqua. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves, associated aquatic and riparian habitat, and contributes to the accomplishment of ACS objectives.	0.4	miles	$43,623
Road Drainage and Surface Enhancement	Road Sediment Reduction	South Umpqua Road Drainage and Surface Enhancement	The South Umpqua River is a Tier 1 Key Watershed. There are approximately 6.23 miles of corridor and 3 stream crossings in the South Umpqua. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Sediment is likely the most limiting factor to aquatic function in the S. Umpqua Basin. Roads do not meet current BMPs and are a source of chronic sediment delivery to fish bearing streams. Surfacing and drainage repair would reduce sediment delivery to fish bearing streams.	10	miles	$781,677

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Road storm-proofing	Road Sediment Reduction	31-4-3.2 Road storm proofing	The South Umpqua River is a Tier 1 Key Watershed. Sediment is likely the most limiting factor to aquatic function in the South Umpqua Basin. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. If culverts fail, substantial sediment could be transported to Shively Creek. Removing culverts will prevent crossing failures that deposit fine road sediments in stream channels. Project should occur before road becomes too overgrown for heavy equipment access.	1	project	$8,843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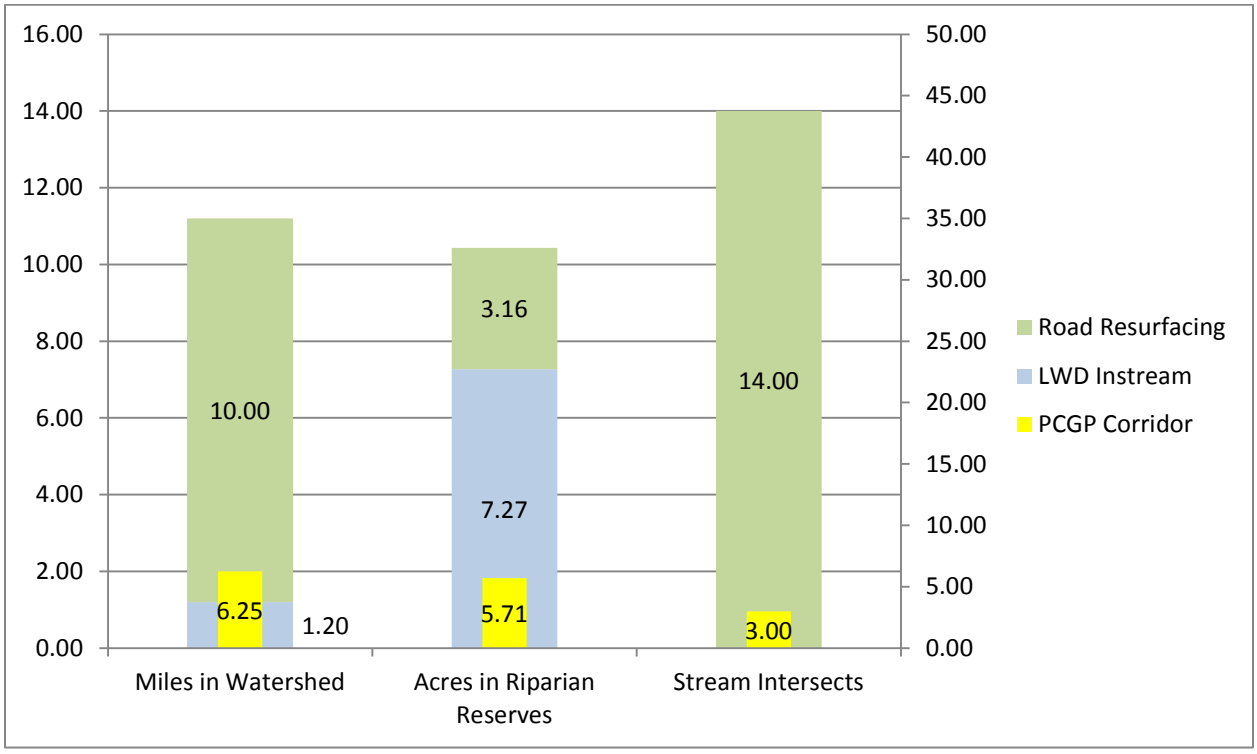
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing
LWD Instream
PCGP Corridor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Miles in Watershed
Acres in Riparian Reserves
Stream Intersects
Road Resurfacing
LWD Instream
PCGP Corridor

Elk Creek South Umpqua (Tier One Key Watershed)

R/W Miles in Watershed	0.24
R/W Acres in Watershed	4.78
Stream Channels Crossed	2 wetlands
Riparian Reserve Acres in R/W	1.13
Designated LSR Acres in R/W	4.78

The PCGP project crosses portions of the Lower Elk Creek subwatershed on BLM lands in the Elk Creek-South Umpqua watershed. No off-site mitigations are proposed in the Elk-Creek South Umpqua watershed because of the limited extent of the PCGP corridor in the watershed.

Trail Creek

R/W Miles in Watershed	3.88		
R/W Acres in Watershed	76.72		
Stream Channels Crossed	Perennial	Intermittent	total
	1	1	2
Riparian Reserve Acres in R/W	4.66		
Late Successional Reserve Acres	0		

The PCPG project crosses parts of the West Fork, Trail Creek and Upper Trail Creek subwatersheds on BLM lands in the Trail Creek watershed.

Aquatic Conditions and Issues

- Road-related sediment has degraded aquatic habitats in Trail Creek. Road decommissioning, stormproofing and surfacing would contribute to reducing road-related sediments in aquatic systems.
- Stream restoration projects within the current extent of fish-bearing streams could be implemented where they meet the following criteria: 1) one or more improvable habitat components (e.g., temperature**, large woody debris,** or substrate) are currently limiting to aquatic habitat quality; 2) predisposing factors (e.g., hydrologic responsiveness, sedimentation, flows and geomorphology) will allow for aquatic habitat improvement; and 3) habitat improvements can practically be realized and persist over time. Generally, the ability of fish-bearing streams in the Trail Creek watershed to meet these criteria decreases with elevation. Efforts should be focused in the East and West Forks of Trail Creek rather than the mainstem.

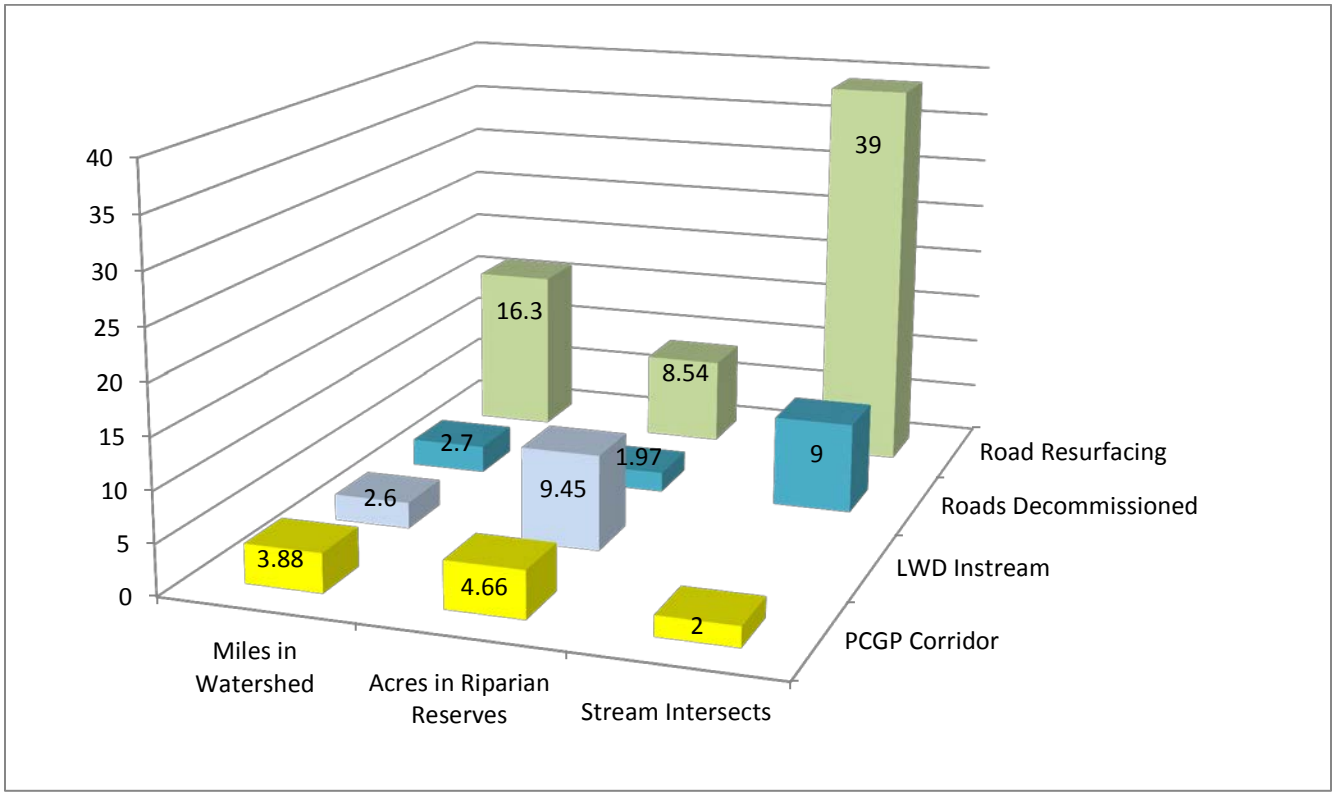
Terrestrial Conditions and Issues

- Risk of stand – stand replacing fire and attendant impacts on LSOG forest habitats, riparian reserves and aquatic ecosystems is a significant issue in the Trail Creek watershed.
- LSOG habitats are limited in this watershed.
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Less fire resistant early and mid-seral plant communities have increased and more fire resistant late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Offsite Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit
Fire Suppression	Fire suppression	Trail Creek Pump Chance	Construction of the pipeline and associated activities will increase fire suppression complexity. Pump chances increase capacity for agency response and help reduce potential fire losses to valuable habitats by providing readily available water sources.	8	sites
Fuels Reduction	Stand Density Fuel Break	Trail Creek Fuel Hazard Reduction	High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP. Construction of the pipeline and associated activities removes both mature and developing stands and will increase fire suppression complexity; however, the corridor also provides a fuel break. Fuels reduction adjacent to the corridor will increase the effectiveness of the corridor as a fuel break. Fuels reduction will lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on the Umpqua NF.	687	acres
fuels Reduction	Stand Density Fuel Break	Trail Creek Fuels Hazard Maintenance	This provides a mechanism for maintenance of fuel breaks over time for the life of the project.	687	acres
LWD instream	Aquatic Habitat	Trail Creek LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.6	miles
Road Decommissioning	Road Sediment Reduction	Trail Creek Road Decommissioning	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in Trail Creek. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Road decommissioning reduces habitat fragmentation, reduces road-related sediment and improves hydrologic connectivity and by reducing road density.	2.7	miles

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit
Road storm-proofing	Road Sediment Reduction	Trail Creek Road Stormproofing	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in Trail Creek. The effects of the PCGP are similar to a road, including possible impacts to flow and sediment regimes. Stormproofing improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	4.3	miles
Road Surfacing	Road Sediment Reduction	Trail Creek Road Resurface	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in Trail Creek. The effects of the PCGP are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-related sediment that could be delivered to stream channels.	16.3	miles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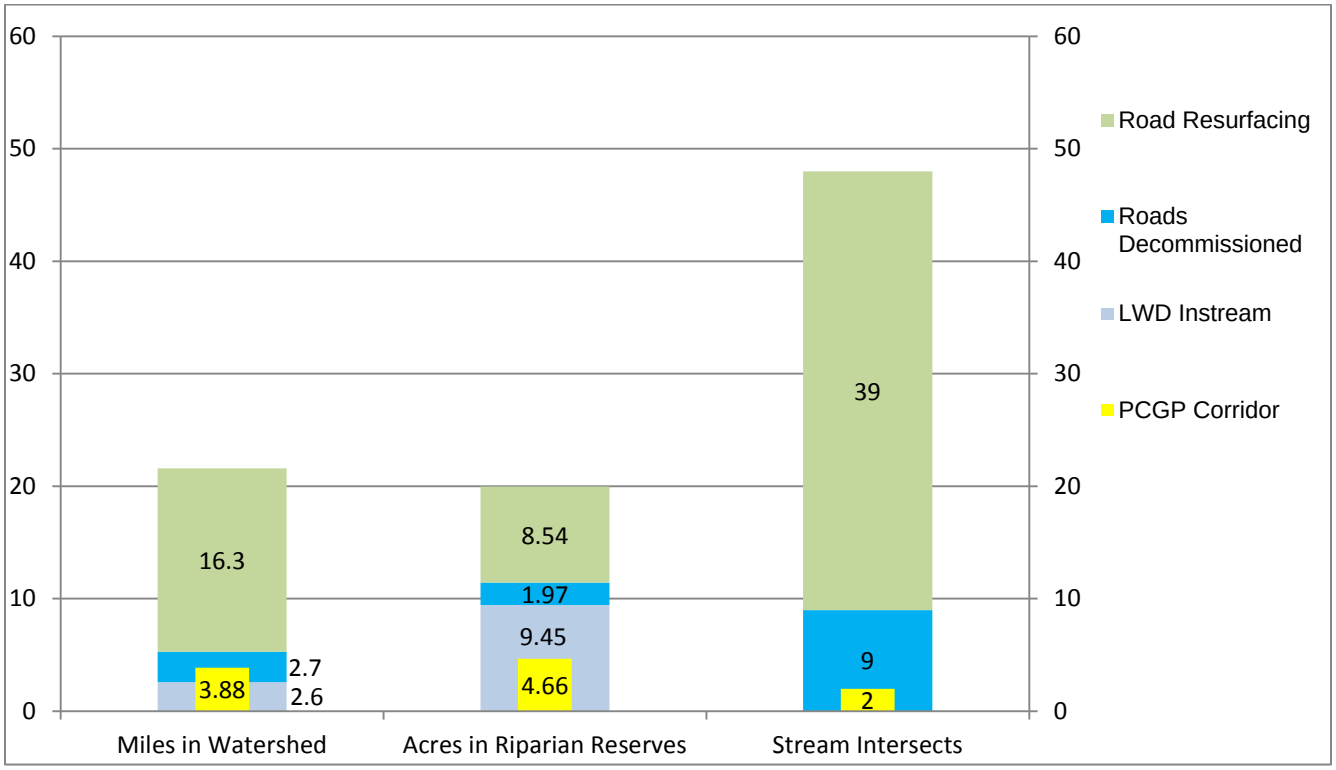
Road Resurfacing
Roads Decommissioned
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects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Road Resurfacing
Roads Decommissioned
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects

Shady Cove - Rogue River

R/W Miles in Watershed	4.42		
R/W Acres in Watershed	80.27		
Stream Channels Crossed	Perennial	Intermittent	total
	0	4	4
Riparian Reserve Acres in R/W	6.91		
Late Successional Reserve Acres	0		

The PCGP project crosses portions of the Indian Creek and Brush Creek subwatersheds on BLM lands in the Shady Cove – Rogue River Watershed.

Aquatic Conditions and Issues

- Road-related sediment has degraded aquatic habitats in Shady Cove – Rogue River watershed. Road decommissioning, stormproofing and surfacing would contribute to reducing road-related sediments in aquatic systems.
- The Brush Creek-Rogue River and Indian Creek-Rogue River have the highest acreage of highly erodible soils in the Watershed. Further, approximately 76 percent of the entire Brush Creek-Rogue River subwatershed is composed of highly erodible soils (USDI BLM 2012).
- Northern California/Southern Oregon Coho salmon are present in the Indian Creek subwatershed.
- Stream temperature has not been identified as a limiting factor for water quality.
- Indian Creek is 303 (d) listed for DO impairment.
- Steelhead are present in the Brush Creek and Indian Creek subwatersheds.
- Peak flows have likely increased as a result of roads and timber harvest.

Terrestrial Conditions and Issues

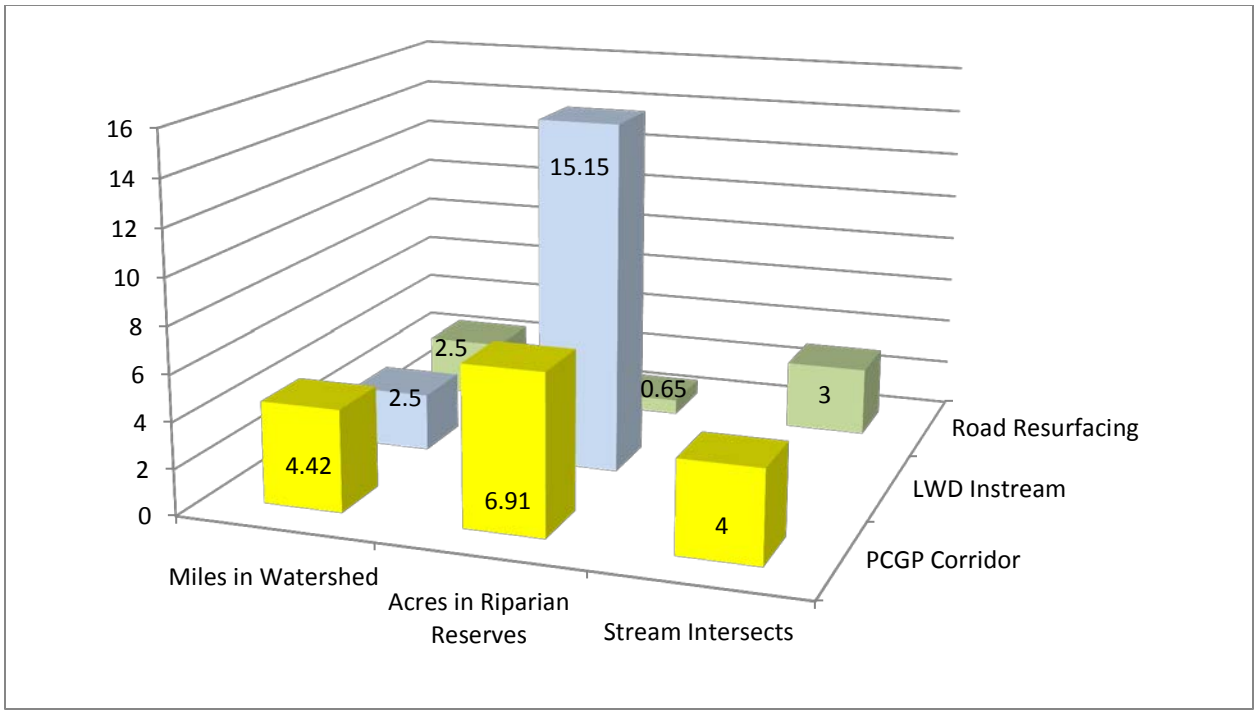
- Risk of stand – stand replacing fire and attendant impacts on LSOG forest habitats, riparian reserves and aquatic ecosystems is a significant issue in the Shady Cove-Rogue River watershed.
- LSOG habitats are limited in this watershed.
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Less fire resistant early and mid-seral plant communities have increased and more fire resistant late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

The Rogue Basin Coordinating Council (2006) assessment identified barriers, water temperature, and water quantity as the most significant aquatic limiting factors (Priority One) in the Upper Rogue WCA. Channel modification, large wood, pool-to-riffle ratio, sediment, stream habitat complexity (Priority Two), and gravel substrate (Priority Three) were also identified as limiting aquatic habitat quality in the Upper Rogue WCA. Similarly, fire risk, roads, and seral stage deficiencies were the most significant terrestrial limiting factors (Priority One), while riparian shade and wood sources (Priority Two) needed for large woody debris recruitment were limiting terrestrial components for salmonid habitats in the WCA (USDI BLM 2012).

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Fuels Reduction	Stand Density Fuel Break	Shady Cove Fuel Hazard Reduction	High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP. Construction of the pipeline and associated activities removes both mature and developing stands and will increase fire suppression complexity; however, the corridor also provides a fuel break. Fuels reduction adjacent to the corridor will increase the effectiveness of the corridor as a fuel break. Fuels reduction will lower the risk of loss of developing and existing mature stands and other valuable habitats to high-intensity fire. This segment is part of the Milo to Shady Cove fuel break and ties in with similar projects on the Umpqua NF.	866	acres	$1,115,452
Fuels Reduction	Stand Density Fuel Break	Shady Cove Fuel Hazard Maintenance	This provides a mechanism for maintenance of fuel breaks over time for the life of the project.	866	acres	$377,775
LWD instream	Aquatic Habitat	Shady Cove LWD	Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	2.5	miles	$170,218

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Road Drainage and Surface Enhancement	Road Sediment Reduction	Shady Cove Road Improvement	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in Upper Rogue. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	1	mile	$9,727
Road Surfacing	Road Sediment Reduction	Shady Cove Road Resurface	Sediment has been identified by the Upper Rogue Watershed Council as a limiting factor for aquatic habitat in the Upper Rogue. The effects of the PCGP are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-related sediment that could be delivered to stream channels.	1.5	miles	$38,907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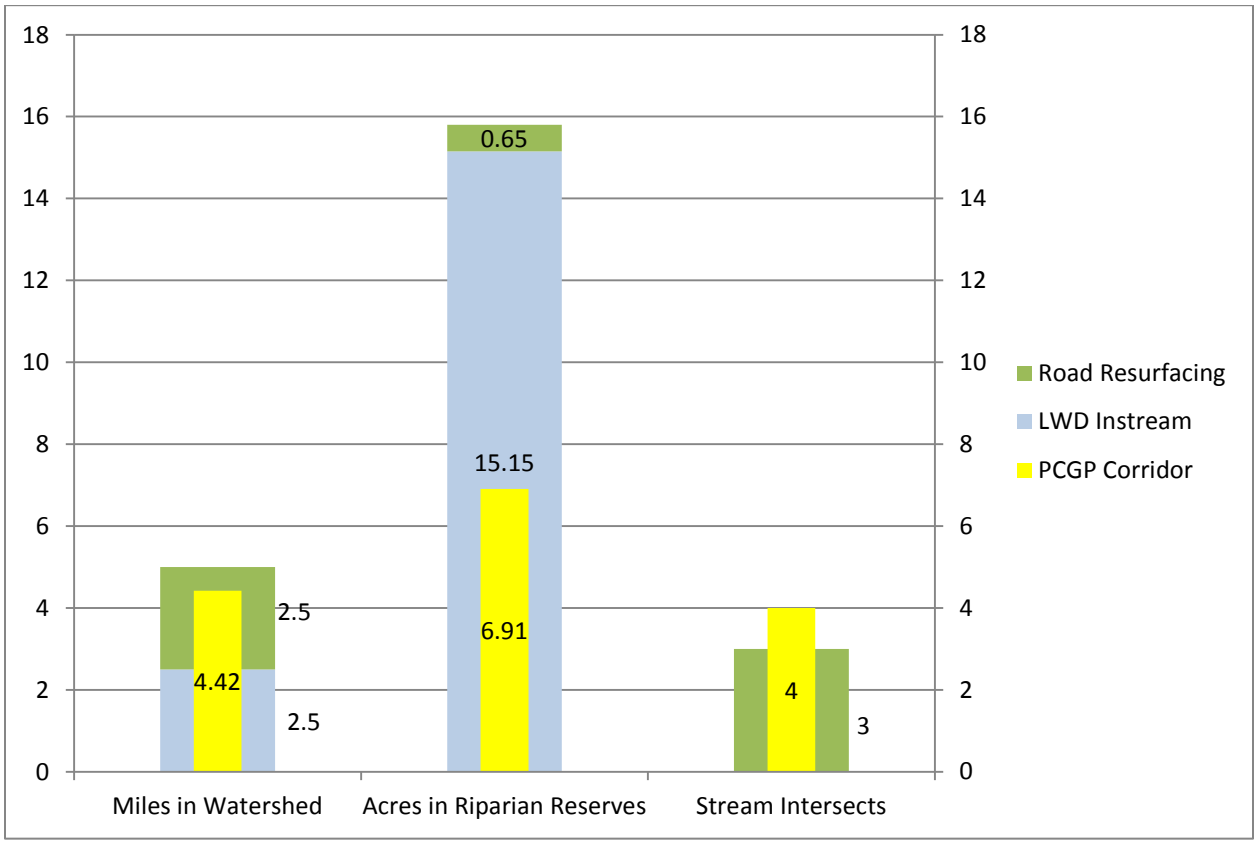
Road Resurfacing
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects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Road Resurfacing
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects

Big Butte Creek

R/W Miles in Watershed	0.67		
R/W Acres in Watershed	9.59		
Stream Channels Crossed	Perennial	Intermittent	total
	1	1	2
Riparian Reserve Acres in R/W	7.39		
Late Successional Reserve Acres	0		

The PCGP project crosses portions of the McNeil Creek subwatershed on BLM lands in the Big Butte Creek watershed.

Aquatic Conditions and Issues

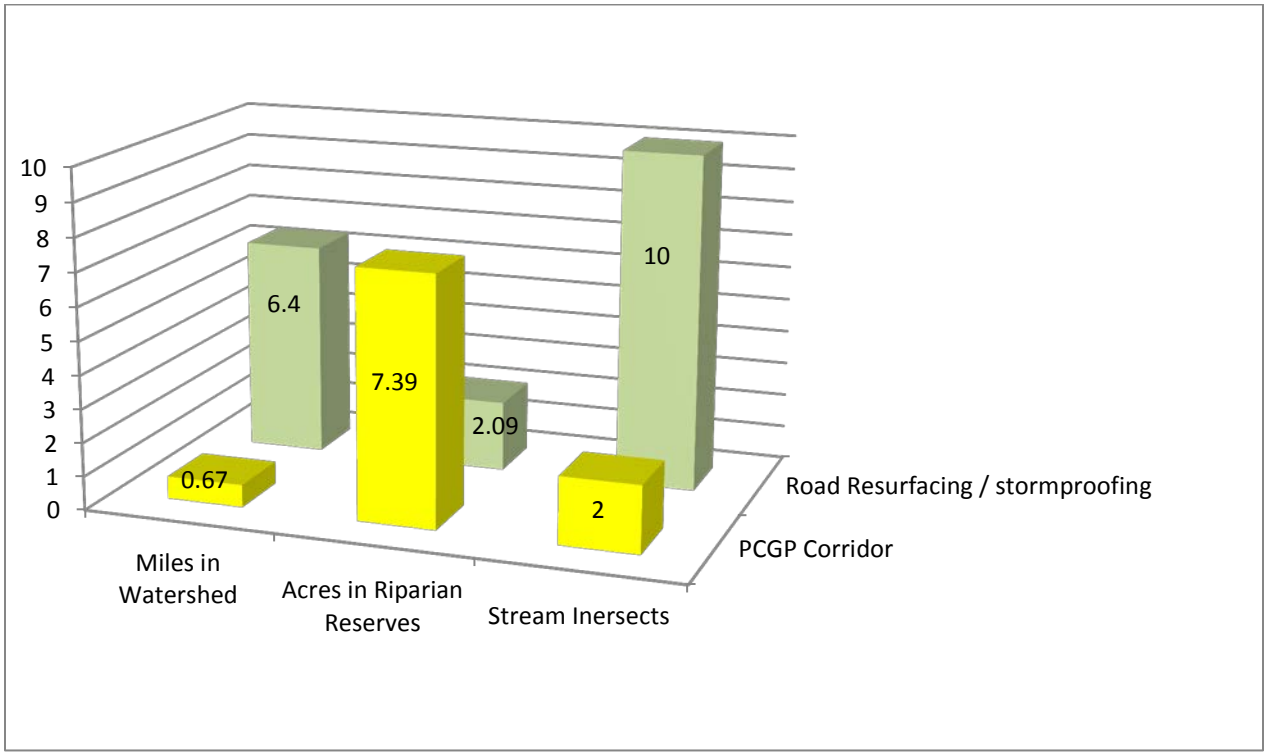
- Road-related sediment has degraded aquatic habitats in Big Butte Creek. Road decommissioning, stormproofing and surfacing would contribute to reducing road-related sediments in aquatic systems.
- Northern California/Southern Oregon Coho salmon (*Oncorhynchus kisutch*), a species listed as threatened under the Endangered Species Act (May 1997) are present in Big Butte, North and South Forks Big Butte, McNeil, Neil, Jackass, and Dog Creeks for a total of 37.2 miles.
- Summer and winter steelhead (*O. mykiss*) use a total of 53.9 miles of habitat in Big Butte, North and South Forks Big Butte, Crowfoot, McNeil, Neil, Camp, and the lower reaches of Jackass, Eighty Acre, Dog, Clark, Box, and Vine Creeks./
- LWD is deficient in many stream reaches.
- Peak flows have likely increased as a result of roads and timber harvest.

Terrestrial Conditions and Issues

- Risk of stand – stand replacing fire and attendant impacts on LSOG forest habitats, riparian reserves and aquatic ecosystems is a significant issue in the Big Butte Creek watershed.
- LSOG habitats are limited in this watershed.
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Less fire resistant early and mid-seral plant communities have increased and more fire resistant late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Habitat Improvement	Terrestrial Habitat Imp.	Big Butte Creek Fritillaria Habitat	The PCGP may impact habitat of Fritillaria gentneri. Outplanting to suitable habitat locations is recommended in the recovery plan.	600	acres	$15,563
Fire Suppression	Fire suppression	Big Butte Creek Pump Chance	Construction of the pipeline and associated activities will increase fire suppression complexity. Pump chances increase capacity for agency response and help reduce potential fire losses to valuable habitats by providing readily available water sources.	1	sites	$7,781
Road Surfacing	Road Sediment Reduction	Big Butte Creek Road stormproofing	Sediment was identified by the Upper Rogue Watershed Council as a factor that limited aquatic habitat in Big Butte Creek. The effects of the PCGP are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	6.4	miles	$249,005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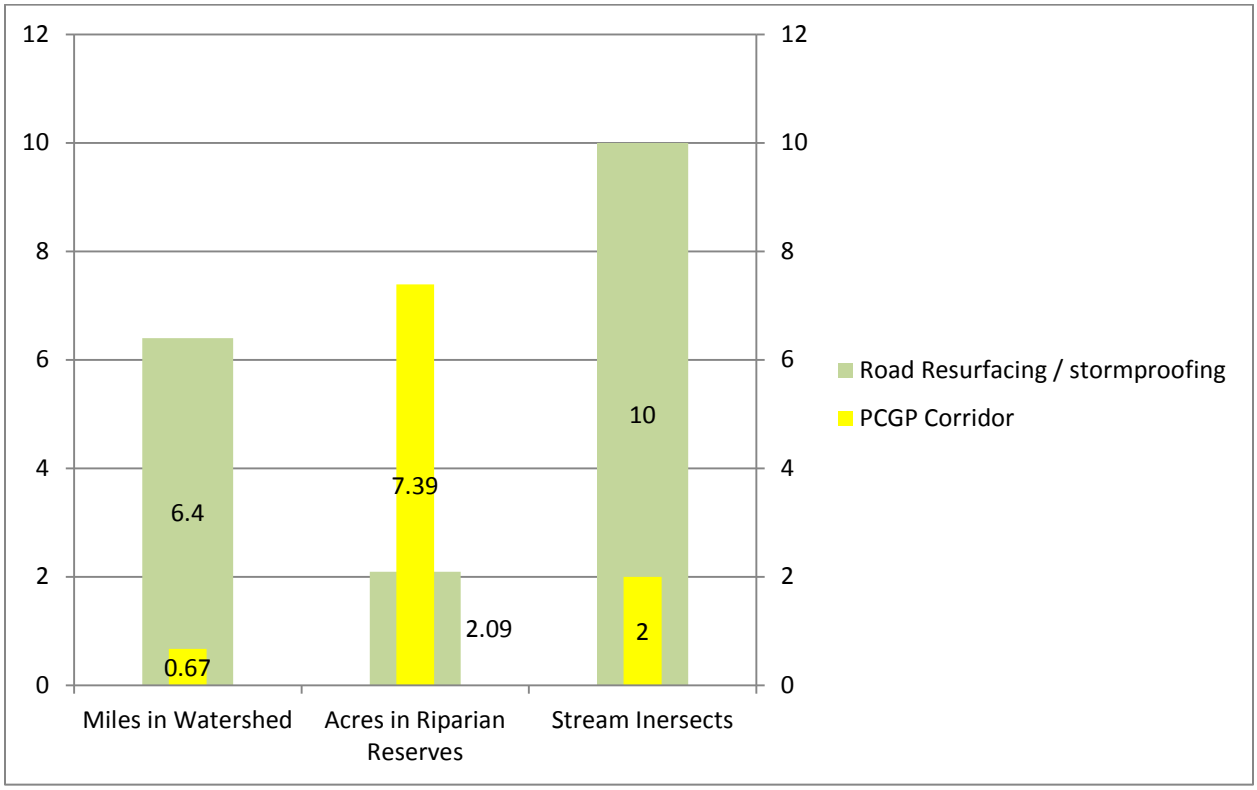
Miles in Watershed
Acres in Riparian Reserves
Stream Inersects
Road Resurfacing / stormproofing
PCGP Corridor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Miles in Watershed
Acres in Riparian Reserves
Stream Inersects
Road Resurfacing / stormproofing
PCGP Corridor

Little Butte Creek (Tier One Key Watershed)

R/W Miles in Watershed	5.99		
R/W Acres in Watershed	113.78		
Stream Channels or Wetlands Crossed	Intermittent	Wetland	total
	1	1	2
Riparian Reserve Acres in R/W	7.99		
Late Successional Reserve Acres	0		

The PCGP crosses portions of the Lick Creek, Salt Creek, Lower North Fork and Lower South Fork Little Butte Creek subwatersheds on BLM Lands in the Little Butte Creek watershed.

Aquatic Conditions and Issues

- Road-related sediment has degraded aquatic habitats in Little Butte Creek. Road decommissioning, stormproofing and surfacing would contribute to reducing road-related sediments in aquatic systems.
- Northern California/Southern Oregon Coho salmon (*Oncorhynchus kisutch*), a species listed as threatened under the Endangered Species Act (May 1997) are present in Little Butte Creek.
- Chinook salmon, steelhead, cutthroat trout and Pacific lamprey are also found in Little Butte Creek
- High temperatures, habitat modification and sediment are key aquatic issues.

Terrestrial Conditions and Issues

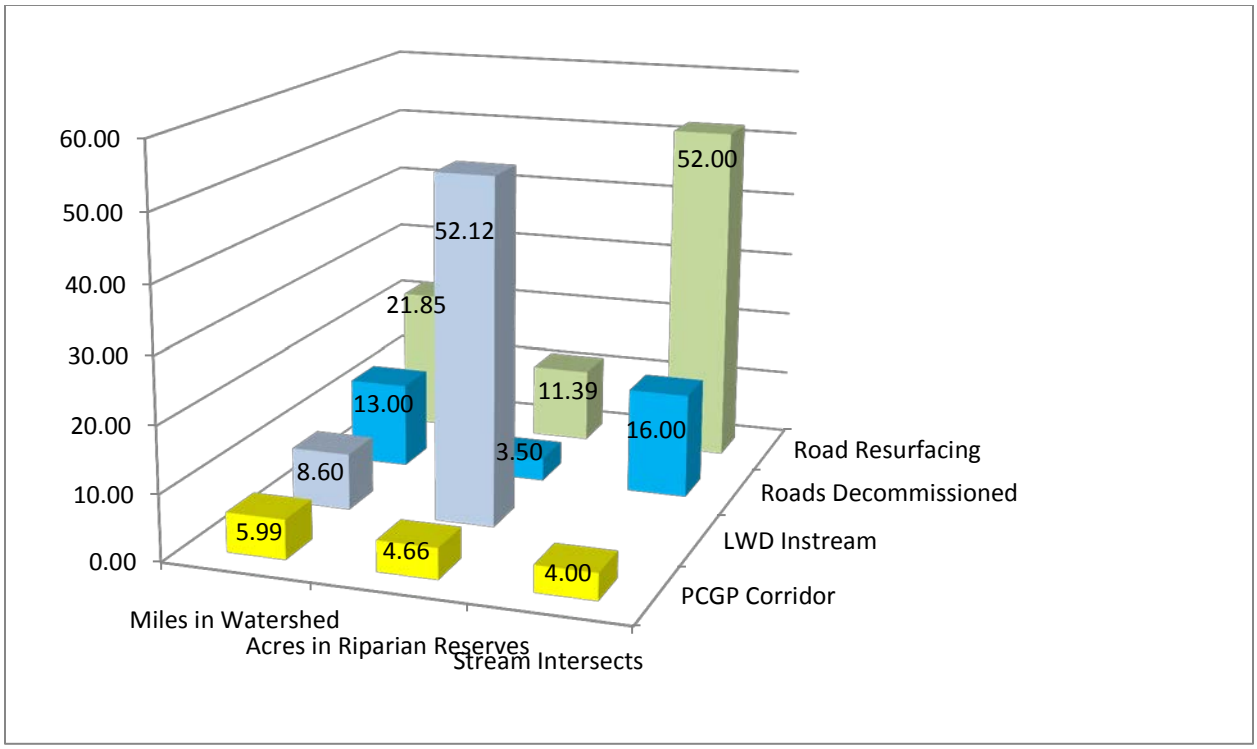
- Risk of stand – stand replacing fire and attendant impacts on LSOG forest habitats, riparian reserves and aquatic ecosystems is a significant issue in the Little Butte Creek watershed.
- Fragmentation from past logging has substantially impacted terrestrial habitats.
- Less fire resistant early and mid-seral plant communities have increased and more fire resistant late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Fire Suppression	Fire suppression	Little Butte Creek Pump Chance	Construction of the pipeline and associated activities will increase fire suppression complexity. Pump chances increase capacity for agency response and help reduce potential fire losses to valuable habitats by providing readily available water sources.	8	sites	$62,251
Fish Passage	Fish Passage	Little Butte Creek Fish Screen	Irrigation diversions have negatively impacted fisheries in Little Butte Creek by causing entrapment. There is a private irrigation ditch with an unscreened diversion and associated push up dam on BLM land in the lower 1.5 miles of Lost Creek. The unscreened ditch is currently accessible to juvenile and adult fish, creating a stranding hazard with limited return access to the main channel. The push up dam is constructed at the beginning of the irrigation season and removed at the end of the season. This stream is considered coho critical habitat and building a push up dam in the creek each season disturbs gravels, generates sediment and creates an unnecessary disturbance during steelhead spawning season. Creating a permanent diversion structure, possibly in the form of a boulder weir, would divert water without yearly maintenance and would provide for both upstream and downstream fish passage.	1	site	$162,113
LWD instream	Aquatic Habitat	Little Butte Creek LWD	Little Butte Creek is a Tier One, Key Watershed. Lost Creek provides habitat for Coho Salmon. Lack of large wood and recruitment of LWD into streams is a consistent factor limiting aquatic habitat quality in all watersheds crossed by the Pacific Connector pipeline. Implementation of the PCGP project would result in the removal of large woody debris from the Riparian Reserves associated with intermittent and perennial streams. The removal of vegetation within and adjacent to the channel will preclude future recruitment of large woody debris into the channel and associated Riparian Reserves. Placing large woody debris at key locations within the channel and associated Riparian Reserves would offset both the short-term and long-term impacts from loss of LWD recruitment to Riparian Reserves and associated aquatic and riparian habitat and contributes to the accomplishment of ACS objectives.	8.6	miles	$626,108

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Road Decommissioning	Road Sediment Reduction	Little Butte Creek Road Decommissioning Butte Falls RA	Little Butte Creek is a Tier One, Key Watershed. Sediment has been identified by the LBC Watershed Council as a limiting factor for aquatic habitat in Little Butte Creek. There are approximately 6 miles of the PCGP corridor and 7 stream crossings on BLM lands in LBC. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Road decommissioning reduces habitat fragmentation, reduces road-related sediment and improves hydrologic connectivity by reducing road density.	2.4	miles	$61,001
Road Decommissioning	Road Sediment Reduction	Little Butte Creek Road Decommissioning Ashland RA	Little Butte Creek is a Tier One, Key Watershed. Sediment has been identified by the LBC Watershed Council as a limiting factor for aquatic habitat in Little Butte Creek. There are approximately 6 miles of the PCGP corridor and 7 stream crossings on BLM lands in LBC. The effects of the PCGP are similar to a road, including habitat fragmentation and potential impacts to flow and sediment regimes. Road decommissioning reduces habitat fragmentation, reduces road-related sediment and improves hydrologic connectivity by reducing road density.	10.6	miles	$343,679
Road Drainage and Surface Enhancement	Road Sediment Reduction	Little Butte Creek Road Improvement	Little Butte Creek is a Tier 1 Key Watershed. Sediment has been identified by the LBC Watershed Council as a limiting factor for aquatic habitat in Little Butte Creek. The PCGP has approximately 6 miles of corridor and 7 stream crossings on BLM lands in the LBC 5th field watershed. The effects of the PCGP are similar to a road, including possible impacts to flow and sediment regimes. Improvement of existing roads restores hydrologic connectivity and reduces sediment by managing drainage and restoring surfacing where needed.	3.5	miles	$283,667
Road Surfacing	Road Sediment Reduction	Little Butte Creek Road Resurfacing	Little Butte Creek is a Tier One, Key Watershed. The PCGP has approximately 6 miles of corridor and 7 stream crossings on BLM lands in the LBC 5th field watershed. The effects of the PCGP are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-related sediment that could be delivered to stream channels.	9.35	miles	$563,503

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Road Surfacing	Road Sediment Reduction	Little Butte Creek Road Resurface	Little Butte Creek is a Tier One, Key Watershed. The PCGP has approximately 6 miles of corridor and 7 stream crossings on BLM lands in the LBC 5th field watershed. The effects of the PCGP are similar to a road, including the potential for sediment mobilization and transport. Road improvement efforts (resurfacing) help restore hydrologic and reduce road-related sediment that could be delivered to stream channels.	9	miles	$350,163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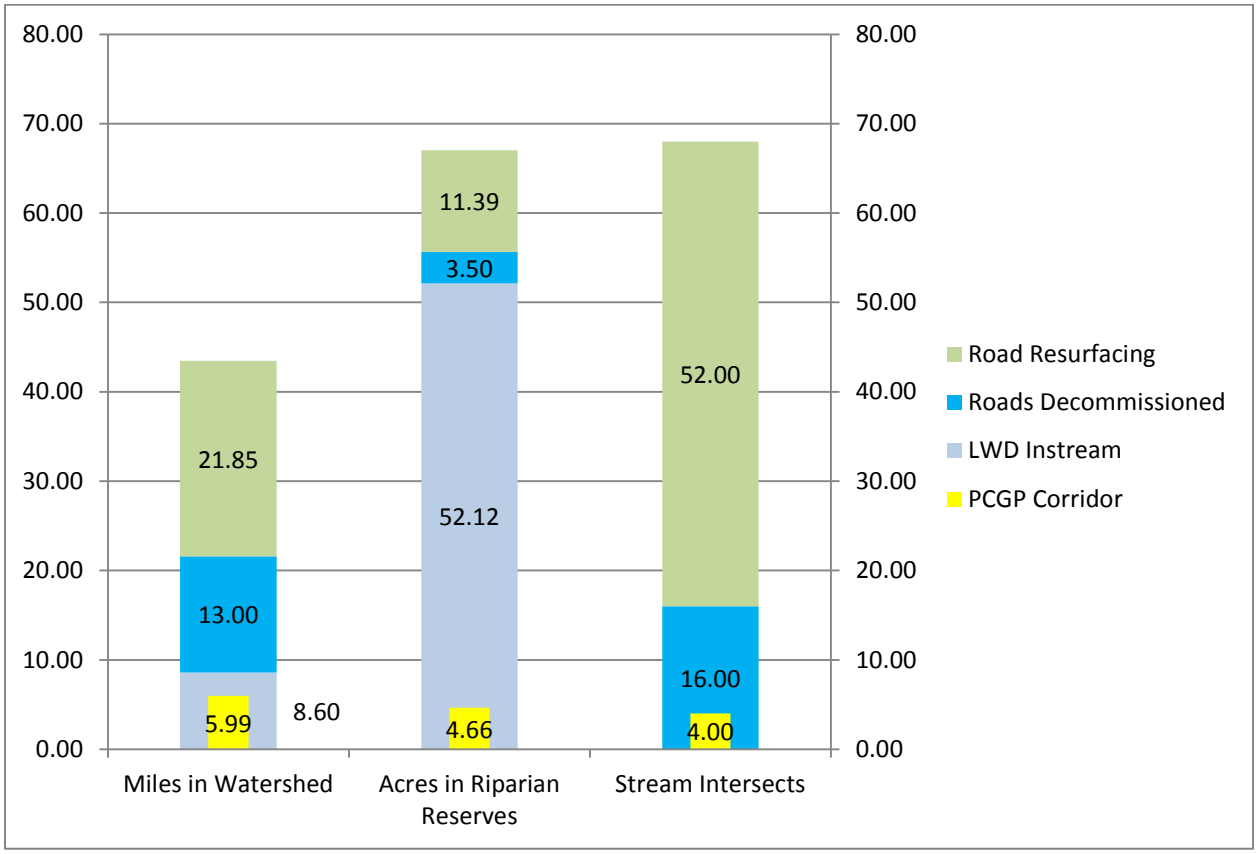
Road Resurfacing
Roads Decommissioned
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects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Road Resurfacing
Roads Decommissioned
LWD Instream
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects

Spencer Creek (Tier One Key Watershed)

R/W Miles in Watershed	1.04
R/W Acres in Watershed	13.69
Stream Channels Crossed	1 Intermittent.
Riparian Reserve Acres in R/W	1.29
Late Successional Reserve Acres	0

The PCGP project crosses portions of the Uppers Spencer Creek and Clover Creek subwatersheds on BLM lands in the Spencer Creek watershed.

Aquatic Conditions and Issues

- Road-related sediment has degraded aquatic habitats in Spencer Creek. Road decommissioning, stormproofing and surfacing would contribute to reducing road-related sediments in aquatic systems.
- High temperatures, habitat modification and sediment are key aquatic issues.

Terrestrial Conditions and Issues

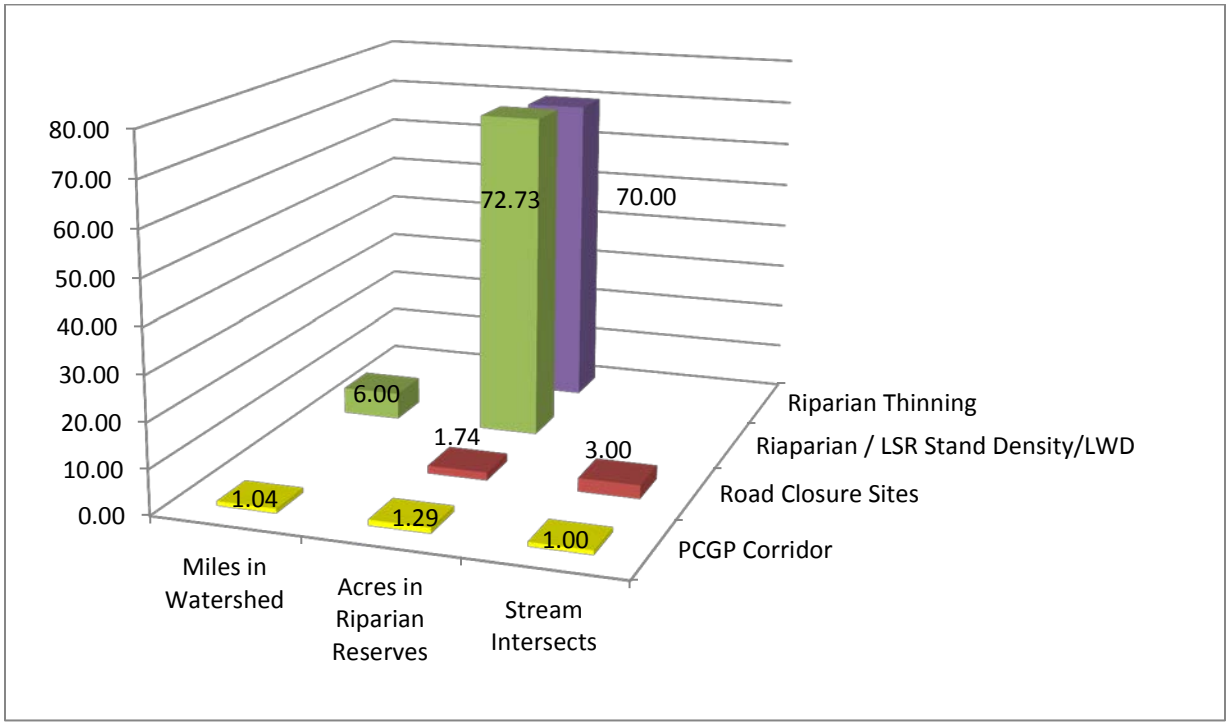
- Risk of stand – stand replacing fire and attendant impacts on LSOG forest habitats, riparian reserves and aquatic ecosystems is a significant issue in the Spencer Creek watershed.
- Fragmentation from past logging and high road densities have impacted terrestrial habitats.
- Less fire resistant early and mid-seral plant communities have increased and more fire resistant late-successional-old-growth stands have decreased relative to the historic conditions.

Proposed Off-Site Mitigations

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Riparian Vegetation	Riparian Stand Density	Tributary Creek Riparian Thinning	Spencer Creek is a Tier One, Key Watershed. Implementation of the PCGP project would require removal of riparian vegetation, thereby influencing the form and function of Riparian Reserves. Thinning would restore forest health and diversity in riparian reserves and stands near streams that are currently overstocked. Thinning would be done in a way that emulates the natural “patchiness” of disturbance events.	70	acres	$44,802

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Riparian Vegetation	Riparian Stand Density	Upper Spencer Creek LSR/Riparian treatment	Spencer Creek is a Tier One, Key Watershed. Implementation of the PCGP project would require removal of riparian vegetation, thereby influencing the form and function of Riparian Reserves. This project would thin, pile and burn dense white fir understory vegetation and fall occasional trees into the stream channel for LWD. This would enhance forest health and diversity with the LSR/Riparian Reserve by restoring stand density to more natural and sustainable levels. This contributes to forest health and sustainability of riparian reserves by increasing resistance to insect and disease losses and reducing the risk of stand replacing fire. LWD in stream channels contributes to meeting water quality and TMDL targets and provides habitat for sensitive fish and invertebrate species.	3	miles	$51,876
Riparian Vegetation	Riparian Stand Density	Miners Creek LSR, Riparian Treatment	Spencer Creek is a Tier One, Key Watershed. Implementation of the PCGP project would require removal of riparian vegetation, thereby influencing the form and function of Riparian Reserves. This project would thin, pile and burn dense white fir understory vegetation and fall occasional trees into the stream channel for LWD. This would enhance forest health and diversity with the LSR/Riparian Reserve by restoring stand density to more natural and sustainable levels. This contributes to forest health and sustainability of riparian reserves by increasing resistance to insect and disease losses and reducing the risk of stand replacing fire. LWD in stream channels contributes to meeting water quality and TMDL targets and provides habitat for sensitive fish and invertebrate species.	3	miles	$51,876
Road Closure	Road Sediment Reduction	Spencer Creek Repair Existing Road Closure	Roads negatively impact wildlife. Implementation of the PCGP project would have road-like impacts on wildlife and require use of a large number of permanent and temporary roads and other access routes. Road closures (barricades) were established in the watershed to reduce road density to meet Resource Management Plan objectives for both the aquatic conservation strategy and reduce impacts to wildlife. This project repairs the existing closure structures to ensure that road closures remain effective. Spencer Creek is a Tier One, Key Watershed. Maintaining road closures also reduces sediment by keeping closed roads revegetated.	12	sites	$10,012

ProjType	MitGroup	Project Name	ProjectRationale	Quantity	Unit	CostWithOH
Road Drainage	Road Sediment Reduction	Spencer Creek Drainage Improvements and Sediment Trap Removal	Spencer Creek is a Tier One, Key Watershed. Although BMP's and other project measures would be implemented, the PCGP would have road-like watershed impacts if constructed, including mobilization of sediment and possible alteration of hydrologic regimes. The project also uses a number of roads for access and construction. Drainage improvements and removing non-functioning cross drains and sediment traps at selected locations would benefit aquatic habitat/connectivity by restoring drainage and reducing sediment transport.	15	sites	$5,895
Road Drainage	Road Sediment Reduction	Keno Access Road Repair and Culvert Replacement	Spencer Creek is a Tier One, Key Watershed. Although BMP's and other project measures would be implemented, the PCGP would have road-like watershed impacts if constructed, including mobilization of sediment and possible alteration of hydrologic regimes. The existing stream crossing (culvert) is undersized in both length and diameter, therefore it ability to meet ACS objectives is minimized. The culvert underlying the existing road bed periodically causes erosion of the road prism and adjacent upland and riparian areas. Replacement of the culvert will allow stabilization of the road shoulder and reduce sediment input to Miner's creek and its contribution of sediment to Spencer creek. If this work is not completed, the condition will eventually lead to increased sedimentation. Replacement of this drainage structure will decrease road-related erosion, increase the hydrologic capacity of the crossing and enhance aquatic connectivity for fish and other aquatic organisms.	1	site	$42,444
Stand Density Habitat	Terrestrial Habitat Imp.	Upper Spencer Creek LSR Density Mgt.	Implementation of the PCGP project would require removal of late-successional habitat, including critical habitat for northern spotted owls. Stand density management reduces the risk of stand replacing fire and accelerates the development of late-successional stand conditions which may benefit northern spotted owls.	270	acres	$31,835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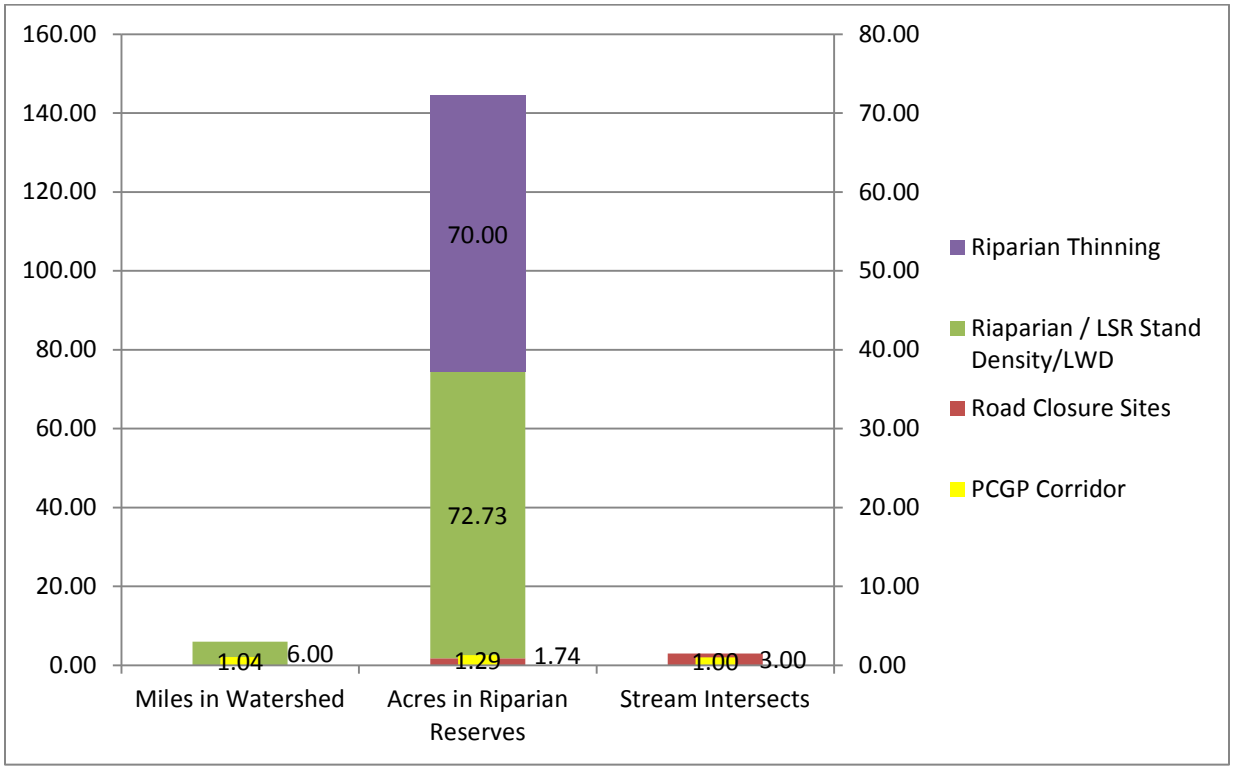
3.00
1.04
1.29
1.00
Riparian Thinning
Riaparian / LSR Stand Density/LWD
Road Closure Sites
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects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6.00
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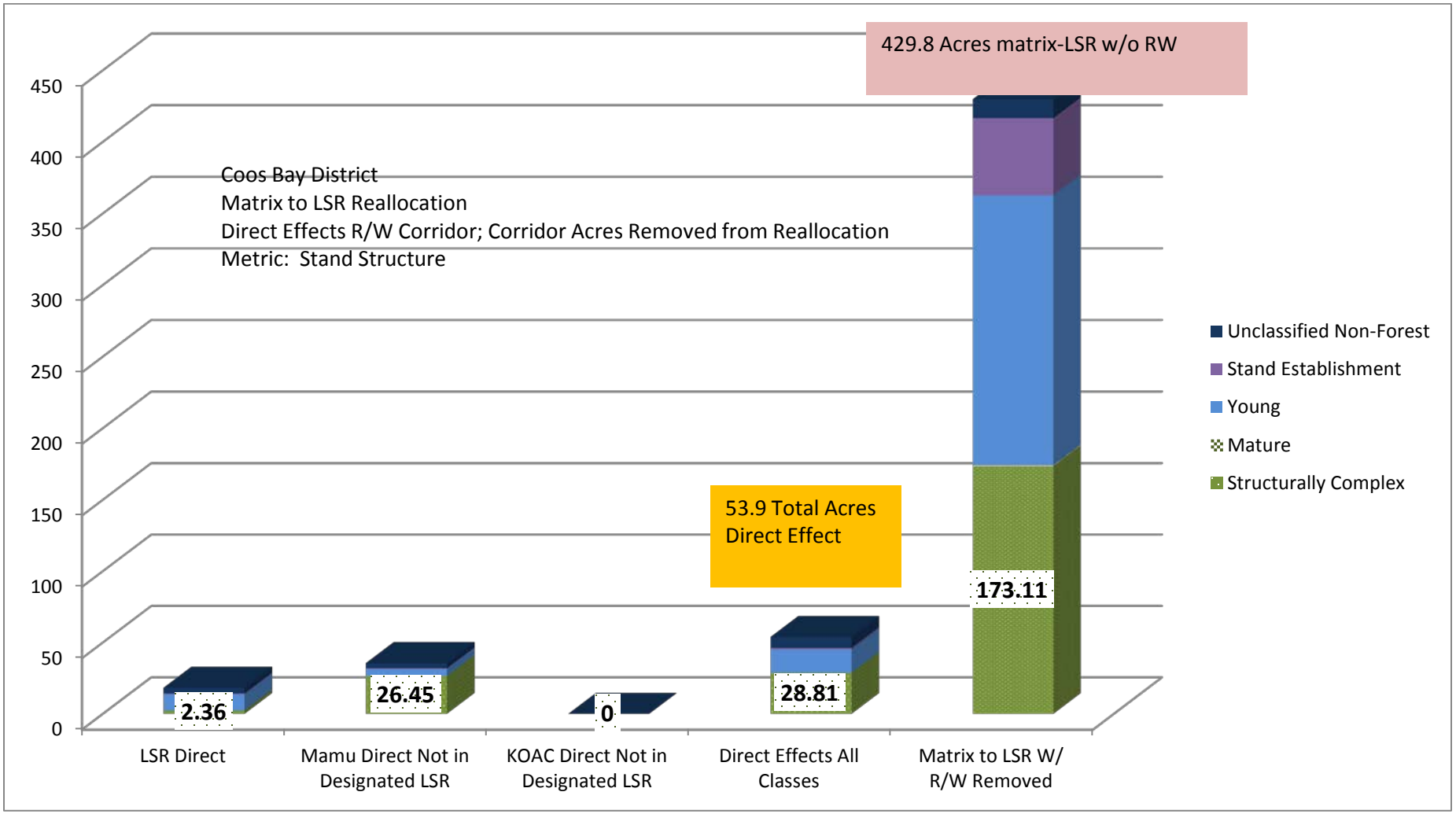
1.74
1.00
3.00
Riparian Thinning
Riaparian / LSR Stand Density/LWD
Road Closure Sites
PCGP Corridor
Miles in Watershed
Acres in Riparian Reserves
Stream Intersects

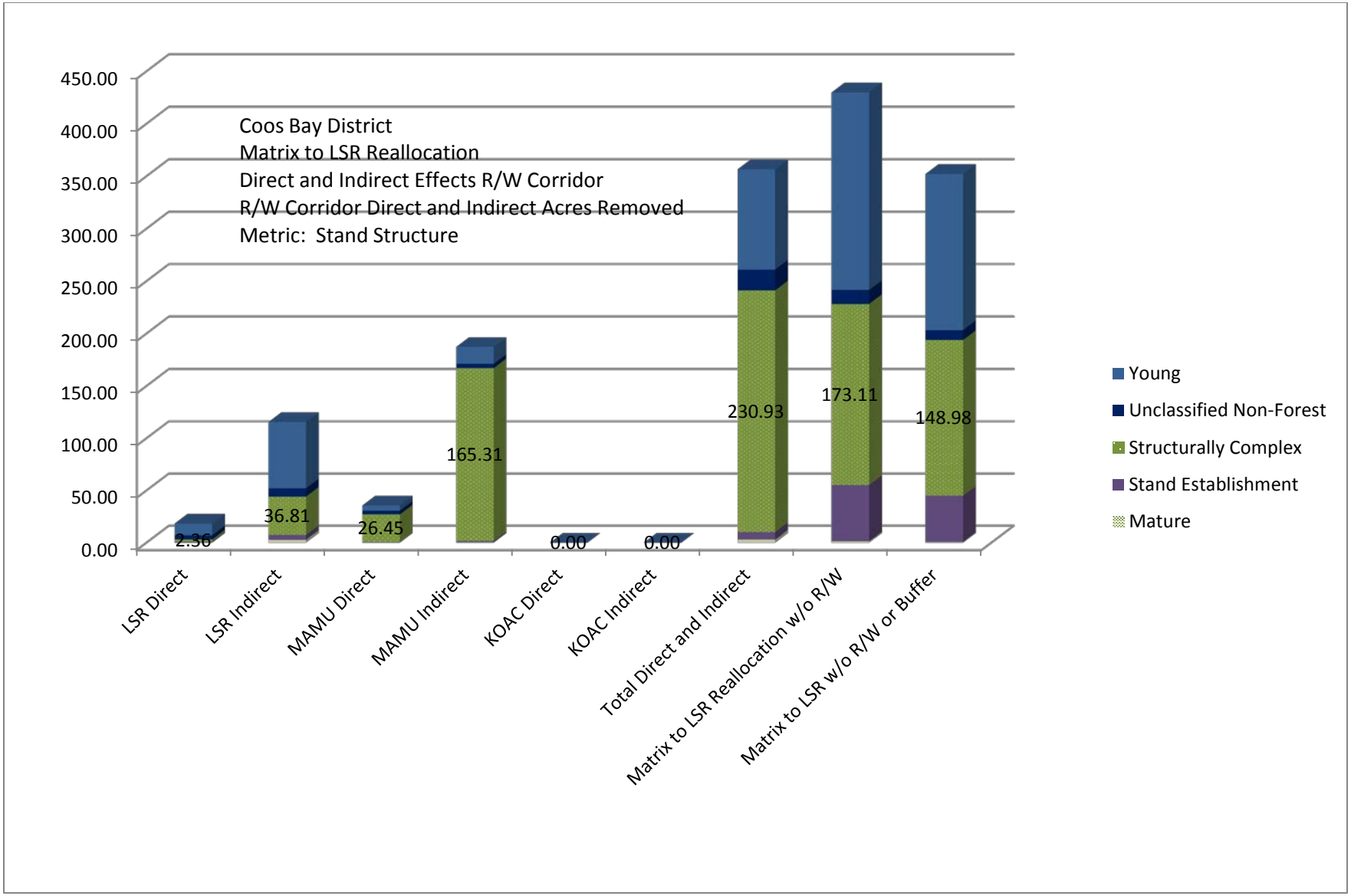
Lower Lost River

R/W Miles in Watershed	0.26
R/W Acres in Watershed	3.54
Stream Channels Crossed	0
Riparian Reserve Acres in R/W	0
Late Successional Reserve Acres	0

The PCGP crosses portions of the Anderson-Rose Diversion Dam subwatershed on BLM lands in the Lower Lost River watershed. No off-site mitigations are proposed in the Elk-Creek South Umpqua watershed because of the limited extent of the PCGP corridor in the watershed.

Reallocation of Matrix Lands to Late Successional Reserve

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Matrix to LSR Reallocation
Direct and Indirect Effects R/W Corridor
R/W Corridor Direct and Indirect Acres Removed
Metric: Stand Structure
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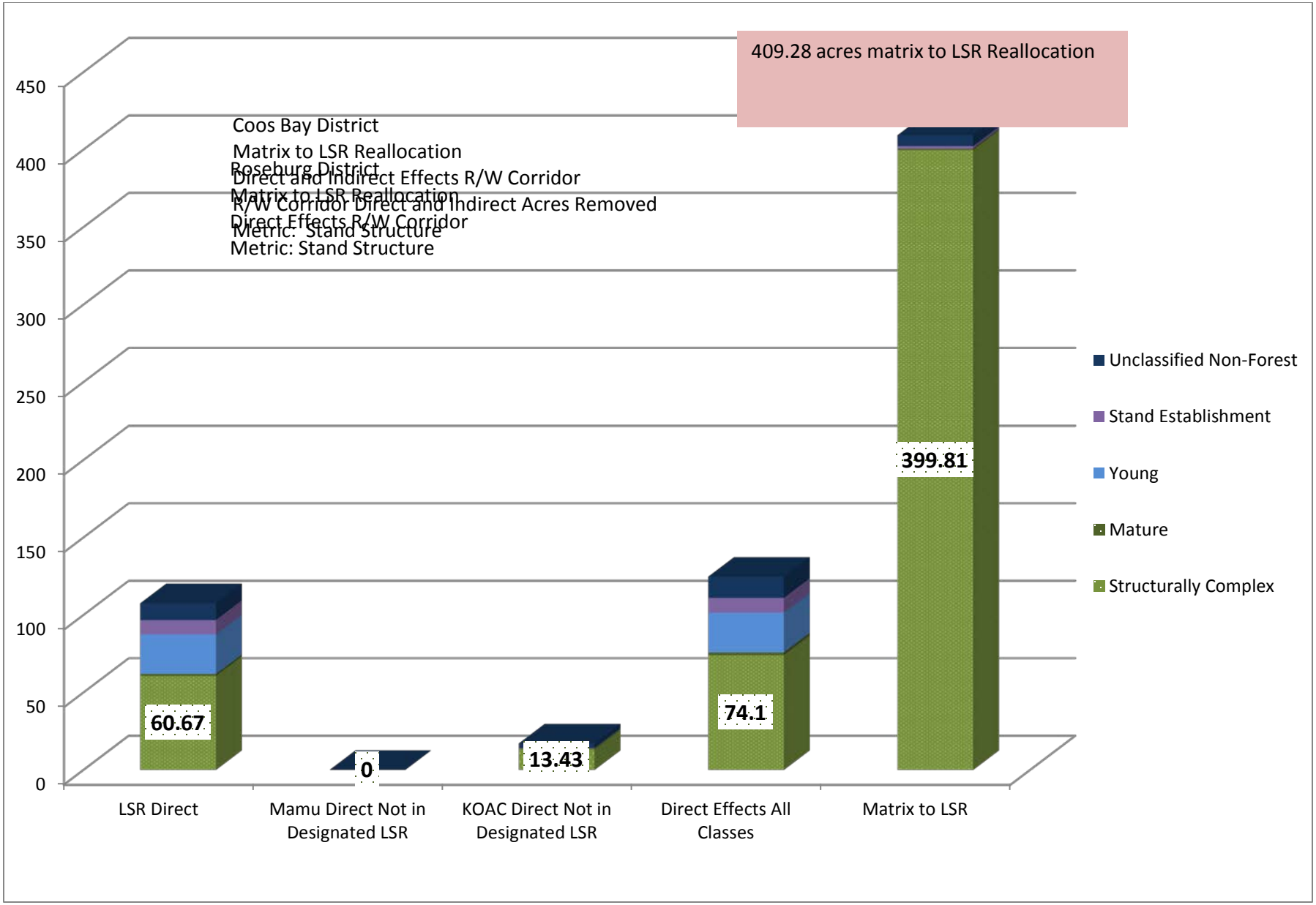
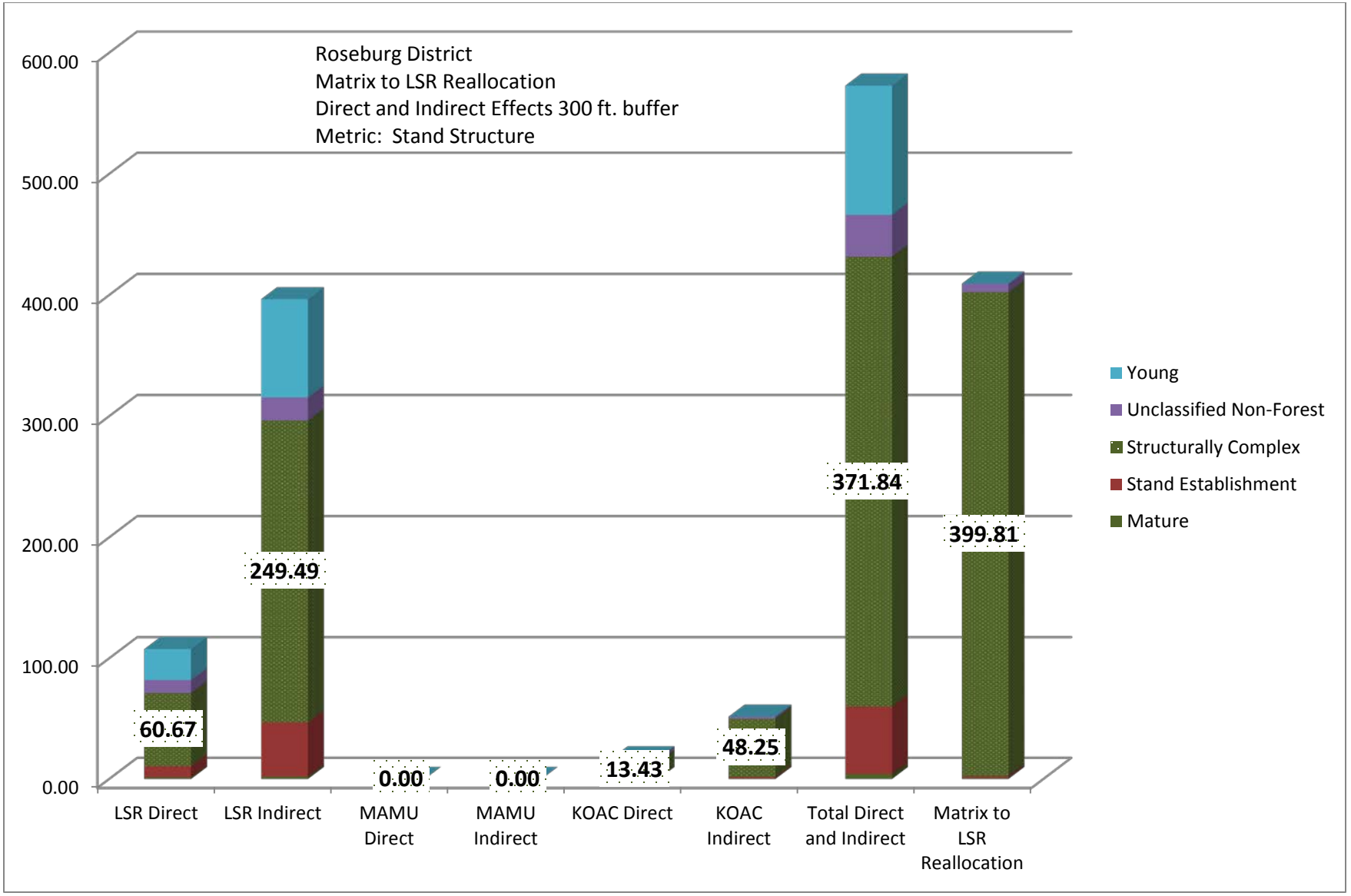
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
2.36
36.81
26.45
165.31
0.00
0.00
230.93
173.11
148.98
LSR Direct
LSR Indirect
MAMU Direct
MAMU Indirect
KOAC Direct
KOAC Indirect
Total Direct and Indirect
Matrix to LSR Reallocation w/o R/W
Matrix to LSR w/o R/W or Buffer
Young
Unclassified Non-Forest
Structurally Complex
Stand Establishment
Mature


409.28 acres matrix to LSR Reallocation
Coos Bay District
Matrix to LSR Reallocation
Roseburg District
Direct and Indirect Effects R/W Corridor
Matrix to LSR Reallocation
R/W Corridor Direct and Indirect Acres Removed
Direct Effects R/W Corridor
Metric: Stand Structure
Metric: Stand Structure
450
400
350
300
250
200
150
100
50
0
60.67
0
13.43
74.1
399.81
Unclassified Non-Forest
Stand Establishment
Young
Mature
Structurally Complex
LSR Direct
Mamu Direct Not in Designated LSR
KOAC Direct Not in Designated LSR
Direct Effects All Classes
Matrix to LSR


Roseburg District
Matrix to LSR Reallocation
Direct and Indirect Effects 300 ft. buffer
Metric: Stand Structure
600.00
500.00
400.00
300.00
200.00
100.00
0.00
60.67
249.49
0.00
0.00
13.43
48.25
371.84
399.81
LSR Direct
LSR Indirect
MAMU Direct
MAMU Indirect
KOAC Direct
KOAC Indirect
Total Direct and Indirect
Matrix to LSR Reallocation
Young
Unclassified Non-Forest
Structurally Complex
Stand Establishment
Mature

Appendix A – BLM Offsite Mitigation Policy

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
www.blm.gov

September 30, 2008

In Reply Refer To:
1740/1790 (310/230) P

EMS TRANSMISSION 10/03/2008
Instruction Memorandum No. 2008-204
Expires: 09/30/2009

To: All State Directors

From: Director

Subject: Offsite Mitigation

Program Areas: All Resource Programs

Purpose: This Instruction Memorandum (IM) outlines policy for the use of offsite mitigation for authorizations issued by the Bureau of Land Management (BLM). This IM replaces IM WO-2005-069 *Interim Offsite Compensatory Mitigation for Oil, Gas, Geothermal and Energy Rights-of-Way Authorizations* (February 1, 2005).

Policy/Action: Offsite mitigation consists of compensating for resource impacts by replacing or providing substitute resources or habitat at a different location than the project area. Offsite mitigation is supplemental to onsite mitigation and is used to enhance the BLM's ability to fulfill its mission of providing multiple uses on the public lands, while ensuring its resource management objectives are met. In making decisions that are within its discretion (taking into account statutes, regulations, and contractual/property rights of the requester), the BLM has an obligation to approve only land use authorizations that are consistent with its mission and objectives. This may mean that the BLM may be unable to permit certain land use authorizations without appropriate mitigation measures. Onsite mitigation alone may not always be possible or sufficient, though often resources are present offsite that can offer suitable compensation for remaining onsite impacts. Consequently, offsite mitigation may be an effective management tool to ensure appropriate land use authorizations.

In order to ensure a sufficient relationship between offsite mitigation and the BLM's mission to manage the public lands, offsite mitigation may be used only when the BLM can demonstrate that the proposed mitigation is reasonably necessary to accomplish an authorized BLM purpose.

When proposed offsite mitigation is geographically distant from the project area, and particularly when it occurs on non-Federal land, the connection to resources for which the BLM is responsible should be clear.

Offsite mitigation may be offered voluntarily by a project proponent, incorporated into the project proposal, and approved by the BLM as a condition of the permit authorization. In certain other cases, the BLM may find it necessary to advise the applicant that the project proposal cannot be approved without additional onsite modification or additional mitigation, including offsite mitigation. There may be a need for offsite mitigation when:

1. Impacts of the proposal cannot be mitigated to an acceptable level onsite; and
2. It is expected that the proposed land use authorization as submitted would not be in compliance with law or regulations or consistent with land use plan decisions or other important resource objectives.

Early in the authorization/approval process, the BLM and the applicant should discuss mitigation

References

Keppeler, E. T., P. H. Cafferata, et al. (2007). State forest road 600 : a riparian road decommissioning case study in Jackson Demonstration State Forest. Sacramento, CA, State of California, the Resources Agency, California Dept. of Forestry & Fire Protection.

Madej, M. (2000). "Erosion and sediment delivery following removal of forest roads." U.S. Geological Survey Western Ecological Research Center.

Tippery, S., K. K. Jones, et al. (2010). Effectiveness Monitoring Report for the Western Oregon Stream Restoration Program, 1999-2008. O. D. o. F. a. Wildlife. Salem, OR.

USDA FS and USDI BLM (1994b). Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, U. S. Forest Service and U. S. Bureau of Land Management, Portland, Oregon.

USDA FS and USDI BLM (2012). Northwest Foreset Plan - The first 15 years (1994-2008): watershed condition status and trends**:** 155.

USDA FS, USDI BLM, et al. (1998). South Cascades Late Successional Reserve Assessment.

USDI BLM (2012). Shady Cove - Rogue River PCGP Project - Specific Watershed Analysis

USDS FS and USDI BLM (1999). South Umpqua / Galesville LSR Assessemnt (LSR RO 223).

Attachment 2

FS Supplemental Mitigation Report 3_1_11v12

3-2-11 mdh

Reply To: 2670
Subject: Mitigation Plan, Pacific Connector Gas Pipeline
To: Randy Miller

Forest Service interdisciplinary teams developed PCGP mitigation plans for each national forest on the PCGP corridor based on the respective Forest Plan, the recommendations of the 2008 and draft (2010) northern spotted owl recovery plans, applicable Late Successional Reserve Assessments (LSRA) and 5th field Watershed Analyses (WA) for watersheds where impacts of the pipeline project occur. Team members used common sense, professional judgment and knowledge of the affected landscapes to develop these measures.

Central themes emerged on each landscape that drove the design of mitigation measures.

- On the Winema National Forest in Spencer Creek, a Tier 1 Key Watershed, current conditions include high road densities, sediment in streams and high stream temperatures (USDA FS WNF 1995 Executive Summary). Desired conditions include reduced road densities and achievement of Aquatic Conservation Strategy (ACS) objectives (USDA-FS_WNF_LRMP 1990; USDA FS; USDI BLM 1994b). The primary objective of proposed mitigations is to improve aquatic conditions in Spencer Creek by decommissioning roads and restoring aquatic habitats. Riparian plantings and in-stream log placement are also planned to further reduce sediment and stream temperature.
- On the Rogue River National Forest in Little Butte Creek, a Tier 1 Key Watershed that also includes part of Late Successional Reserve 227, current conditions include high road densities, high stand densities, sediment delivery to stream systems from roads and high stream temperatures (USDA FS; USDI BLM 1997; USDA FS; USDI BLM; USDI FWS 1998). Desired conditions include reduced stand densities, development of late-successional stand characteristics in LSR 227 and achievement of ACS objectives (USDA-FS: RRNF LRMP 1990; USDA FS; USDI BLM 1994b). Mitigations in Little Butte Creek are intended to reduce road densities by decommissioning roads, accelerate the development of interior stand conditions by accelerating stand development and restoring LS stand characteristics and restore aquatic systems.
- On the Umpqua National Forest, current conditions include high stand densities and the threat of stand replacing fire in LSR 223, fragmented habitats, sediment delivery to stream systems from roads, blockages of fish passage by roads and the presence of non-native invasive species (UNF 1995; UNF 1995b; USDA FS; USDI BLM; USDI FWS 1998; BLM 1999). Desired conditions include reduced risk of stand-replacement fire in LS habitats, reduction of fragmentation, restoration of native species and achievement of ACS objectives , ,(USDA-FS: UNF LRMP 1990; USDA FS; USDI BLM 1994b; UNF 1995; UNF 1995b; USDA FS; USDI BLM; USDI FWS 1998). Mitigation measures are intended to reduce the risk of catastrophic fire by integrated stand density reduction and fuels management projects that build off of the PCGP corridor, provide fish passage at key stream crossings, restore native plant species by eliminating non-native invasives and reduce road-related sediment delivery to streams.

The original mitigation plans was filed with FERC as part of the PCGP's application for this project and considered in the FERC FEIS. FERC made implementation of the mitigation plan a condition of the certificate of public convenience and necessity issued December 17, 2009. Additionally, Pacific Connector has signed, and filed with FERC, an Agreement in Principle to guarantee funding of these projects. A central provision of the mitigation plan is that it is to remain adaptable to new information and changed conditions.

Since the mitigation plan was filed with FERC, the Forest Service has added additional mitigations on the Winema National Forest and corrected inconsistencies in road closures and coarse woody debris placement on the Rogue River and Winema National Forests. These are minor changes within the scope of the original plan and Agreement in Principle. The amended mitigation plan for the PCGP is shown in Table 1 which has been previously provided. A supplemental analysis of changes in the mitigation plan on each national forest is attached. GIS shape files are available for each mitigation proposal for additional analysis if needed. .

Forest Plans of the Umpqua, Rogue River and Winema National Forests were amended by the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, otherwise known the Northwest Forest Plan (NWFP). Standards and Guidelines for new developments in Late Successional Reserves (USDA FS; USDI BLM 1994b p. C-17) make provisions for pipeline corridors but require that projects "minimize or mitigate" impacts so that the new development is neutral to beneficial with respect to LSR habitats. With respect to riparian and aquatic habitats, Standards and Guidelines for Lands, LH-4 for activities other than surface water developments (USDA FS; USDI BLM 1994b p. C-37) direct agencies, to "issue leases, permits, rights-of-way, and easements to avoid adverse effects that retard or prevent attainment of Aquatic Conservation Strategy (ACS) objectives". In determining consistency with the ACS and other forest plan compliance issues, decision-makers may consider the effects of other present and *reasonably foreseeable* future actions on watershed conditions[1]. The Forest Service considers these mitigations to be reasonably foreseeable because they were filed by the applicant with FERC, are a condition of the FERC certificate, have a committed source of funding and are consistent with their respective Land and Resource Management Plans and other agency mid-level planning documents. The attached analysis supplements the FERC FEIS for the purposes of Forest Service decision making, and focuses on supporting evaluations of Forest Plan consistency by the Forest Service.

Please contact Rob Cox (541-767-5042), lead biologist for the PCGP project on the Rogue River, Umpqua and Winema National Forests or Wes Yamamoto (541-825-3150), project lead for the national forests if you have questions.

Attachment: Supplemental Mitigation Report

[1] 1950 memo dated 5/22/2007

Table 1: FS Amended Mitigation Plan

Miti-gation Group	Related Forest Plan Goals and Objectives	Mitigation Activity	Location	Amount	Treat-ments in 50 year Period	Resource Benefit	Rationale
Roads	**Key Watersheds**: Reduce existing system and nonsystem road mileage. There will be no net increase in the amount of roads in Key Watersheds. (ROD C-7) **Soil Productivity**: maintain and enhance soil productivity and soil stability. (UNF IV-67; RR 4-1)) **Wildlife:** To provide for present and future habitat needs of wildlife species Contribute to the recovery of all threatened or endangered species (UNF IV-39, RR 4-2) **Water Quality**: maintain or enhance water quantity, quality, and timing of streamflow (UNF IV-59, RR 4-1) **Fisheries:** protect, maintain and, where appropriate, enhance the productivity of fish habitat (UNF IV-33, RR 4-2).	Decommission/ obliterate roads, barricade road entrance w/permanent landscape structures (berms, boulders, etc.), remove culverts, restore drainage, recontour roadbed to original slope, large wood placement, and seed/plant.	Umpqua National Forest, LSR 222, 223	7.6 Miles	1	LSR, Northern Spotted Owl, Pacific fisher, other late-successional habitat dependent species, riparian habitat, aquatics, SONC Coho, Steelhead, soil productivity	Some natural-surface roads have poor drainage that can lead to erosion and increased sediment in nearby streams. Road maintenance or obliteration is needed to improve drainage and to reduce chronic sediment input to the stream systems. The objective of road decommissioning for this project is to accelerate the revegetation of the decommissioned road with trees. This mitigation also offsets the impacts of soil compaction and displacement within the construction right-of-way by reducing compaction in the decommissioned roadbeds. This will increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from surface erosion. A 30-50 foot wide route along the pipeline route will be maintained in early successional habitat. In addition a construction zone of 100 foot width or wider will be cut through mature forest, setting back development of mature forest habitat by one or more centuries. This strip of land, in a forested ecosystem, provides a barrier for movement of small animals between the remaining forest blocks and degrades neighboring habitat through edge effects and fragmentation. This is of special concern in riparian ecosystems where movement of wildlife species is concentrated. Planting selected roads in conjunction with precommercial thinning treatments (see other mitigations) would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Removal of culverts and roadbeds in riparian reduces sedimentation to the waters. This mitigation meets ACS objectives 2, 4, 5, 8 & 9. Little Butte Creek and Spencer Creek are Key Watersheds and road reduction is a major objective (NWFP ROD C-7). Note that this would be most effective if done in conjunction with the thinning proposed. This mitigation also offsets the impacts of soil compaction and displacement within the construction R/W.
			Little Butte Creek Key Watershed, Rogue River-Siskiyou LSR 227 (road closures proposed intersect 32 streams and include 1 fish bearing stream, 1 perennial non-fish bearing stream and 30 intermittent streams. Proposal decommissions 6.7 miles of roads in riparian reserves and will allow restoration of riparian vegetation on approximately 14.3 acres of riparian vegetation.)	53.2 Miles (Reduced from 54.5 miles)	1		
			Spencer Creek Key Watershed, Winema National Forest (Proposed road closures intersect 25 intermittent streams. Proposal decommissions 5.3 miles of roads in riparian reserves and will allow restoration of approximately 12.8 acres of riparian vegetation)	21.4 miles (new mitigation)	1		
		Close roads with barricades and remove culverts; revegetate, outslope road prism but do not obliterate.	Umpqua NF	5.4 Miles	1	Wildlife sensitive to disturbance, improves aquatic and terrestrial connectivity.	Close roads and remove culverts and treat weeds Mowing and maintenance of pipeline corridor, temporary road construction, and road use are direct disturbance impacts to wildlife. Road closure will mitigate some of those impacts, improve interior stand connectivity and benefit aquatic habitats over time.
		Road stormproofing	Umpqua NF	2.17 miles	1		Replacing culverts with hardened low water crossing (drain dips), fill removal, outsloping and erosion control on disturbed areas

Miti-gation Group	Related Forest Plan Goals and Objectives	Mitigation Activity	Location	Amount	Treatments in 50 year Period	Resource Benefit	Rationale
Stand Density and Fuels Management	**Late Successional Reserves:** Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem. (ROD, C-11) **Matrix Lands**: Most timber harvest and other silvicultural activities would be conducted in that portion of the matrix with suitable forest lands, according to standards and guidelines. (ROD, C-39) Efficient production of wood fiber to satisfy National needs and benefit local economies (UNF IV-42, RR 4-2) **ACS Objectives** 1,2, 5, 8.	Integrated Stand Density and Fuels Treatments: Commercial Thin, Precommercial Thin, Fuels Treatments adjacent to Pipeline corridor Removal of offsite pine in old plantations.	Umpqua LSR 223	2081 Acres Vegetation Rx with 1128 acres of underburns (Includes 350 acres of offsite pine removal)	1 Vegetation treatment, 3 underburns	Late successional and old growth dependent species and forest ecosystems. Timber production on Matrix Lands.	Both mature stands and developing stands will be removed during pipeline construction. Impacts to mature and developing stands will exceed the life of this project by many decades. Density management will increase longevity of existing mature stands by reducing losses from disease, insects and fire. Density management in younger stands will accelerate development of LSOG. Associated fuel reductions reduce risk of loss to fire and reduce potential fire size and intensity. Biological resources are not compensated by land allocation change. Removal of LSOG is essentially a permanent loss that cannot be replaced. Young stands will take 70 years to develop into LSOG so this is not a 1-1 replacement. LSR Assessments have identified the importance of density management to control losses to stand replacing fire. In order to effectively offset permanent loss, entire stands need to treated so habitat over time becomes contiguous and is in proximity of the project. The proposed mitigation is centered on the ecological values associated with late-successional habitat. The values to associated species, many other ecosystem goods and services components such as micro organisms, soils and vegetative cover inter act to purify air and water, regulate the climate and recycle nutrients and wastes is very complex to establish appropriate level of mitigation for the loss of irreplaceable habitat late-seral forest. The proposed ridge line pipeline route intersects and area that has had reoccurring lighting strikes and has potential for stand replacement fires. This mitigation will assist in protection and restoration of the late-seral forest values. This mitigation provides multiple resources values for the LSR, Forest, adjacent private landowners and public.
			Umpqua NF Matrix	1341 Acres Vegetation Rx with 1000 Acres of underburns (increased from 907 Acres)			
		Precommercial thin young harvest plantations in a single entry to create a pattern and spacing that will accelerate development of mature forest characteristics. These stands are in LSR but are not adjacent to the pipeline and are in addition to acres above.	Rogue River-Siskiyou NF LSR 227.	600 Acres	1 (staggered over a period of 3 years)	LSR, Northern Spotted Owl, Pacific fisher, other late-successional habitat dependent species	There will be direct impacts to existing interior, developing interior habitat. The project will result in additional fragmentation and preclude the recovery of fragmented habitat for those stands adjacent to the pipeline corridor. Maintenance of pipeline corridor will provide a continued vector for predators, early-seral species and non-native species. Also the project will result in a direct loss in biological services provided by mature forest characteristics for many decades past the life of this project. Both mature stands and developing stands will be removed during pipeline construction. Density management of forested stands will assist in the recovery of late-seral habitat, impact from fragmentation, reduction in edge effects and enhance resilience of mature stands. Accelerating development of mature forest characteristics will shorten the impacts of those biological services loss due to pipeline construction. Thinning of young stands is a recognized treatment within LRSs if designed to accelerate development of late-successional habitat characteristics (NWFP ROD C-12). ROD Pages B-11 ACS Objectives , C-11 and C-17.
			Umpqua NF LSR 223	425 Acres (in addition to Fuel Break Project Above)			

Miti-gation Group	Related Forest Plan Goals and Objectives	Mitigation Activity	Location	Amount	Treatments in 50 year Period	Resource Benefit	Rationale
Upland Terrestrial	**Late Successional Reserves**: managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. (ROD C-11) **Long Term Soil Productivity**: Maintain or improve soil site productivity in all resource management activities Rehabilitate degraded land to a productive state. (RR 4-1, UNF IV-67) **Wildlife:** To provide for present and future habitat needs of wildlife species Contribute to the recovery of all threatened or endangered species (UNF IV-39, RR 4-2) **Biological Diversity:** Maintain viable representation of native plant and animal species, and biological communities. (UNF IV-36, RR 4-2)	Within LSR manage snags densities at 16/acre > 10.0 in, of which 8/acre > 20 in dbh. within the Matrix manage snag densities at 4/acre >20 in dbh. to mitigate loss of current and future sang habitat from removal large trees and snags within the construction clearing zone and the removal of adjacent hazard trees for the life of this project. Managing for this level of snag habitat provide for a greater assurance of associated species abundances within the LSR and Matrix (DecAID). ROD C-C11 and C-40	Umpqua NF LSR 223	175 Acres	1	LSR, Northern Spotted Owl, Pacific fisher, other late-successional habitat dependent species. Matrix benefits all snag dependent species.	Mitigate immediate and future impacts to snag habitat from the clearing of the pipeline right-of-way. The project prevents development of large snags during the life of the project and for decades after. Corridor construction will result in loss of snag habitat on approximately 775 acres of corridor construction (includes safety zone buffer). Data relies on the Cow Creek Watershed Analysis which suggests the watershed is far below historic levels of snag habitat due of past management actions. This project will add to those cumulative impacts. As snags are a critical component of LSR spotted owl habitat, replacement is needed. Snag requirements are specifically outlined in the Forests' LRMPs and NWFP. Forests require analysis and mitigation under most management activities. Replacement would be immediate though there would be a 10 year delay as snag decay develops. Snag management is required in the RRNF LRMP (4-20), with levels set under the various management directions. Snag Management is discussed in the NWFP for LSRs on C-14 and 15 of the ROD (items 4 and 7). Snag management levels are based on the Forest's Plant Association Guidelines. Snags are also discussed in the South Cascades LSR Assessment (Chap. 3).
			Rogue River-Siskiyou NF LSR 227	600 Acres	1		
			Umpqua NF Matrix	175 Acres	1		
		Manage Logs (Coarse woody material) within the pipeline corridor and in adjacent stands that have a deficiency in down wood due to past management.	Umpqua NF LSR 223	100-200 Acres (Reduced from 350 Acres)	1	LSR, Northern Spotted Owl, Pacific fisher, other late-successional habitat dependent species	Mitigate for the loss of recruitment of large down wood to adjacent stands and within the construction clearing zone. The project will forgo the development of large down wood for the life of the project and for decades after. Downed wood is a critical component of Mature Forest ecosystems. Large wood replacement will partially mitigate for the barrier effect of the corridor by creating structure across the corridor for use by small wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID). ROD C-11. Acres that can be treated are necessarily limited by material available from the corridor.
			Rogue River-Siskiyou NF LSR 227	200-400 Acres (Reduced from 600 Acres)	1		
		Treatment of noxious weeds, planting of native species, treatment of encroaching conifers and burning,	Umpqua NF Unique and Mosaic Habitats and Roadside Nox Weeds	120 Acres meadow restoration, 6.7 miles of roadside weeds.	1	Native plant and wildlife communities.	Mitigate impacts to Unique habitats impacted by the project, There will be loss of forest habitat buffering the unique habitats and disruption to soil horizons enhancing the opportunities for non native plant species.
		Planting at specific sites to grasses that benefit Mardon Skippers and Elderberry to benefit Short-horned Grasshopper.	Rogue River-Siskiyou NF LSR 227	20 Acres	1	Mardon Skipper Butterflies and short horned grasshoppers	The Dead Indian Plateau region is one of three known sites for Mardon Skipper butterflies in the world. It is also adjacent to a known site for Short-horned Grasshoppers. Both species are on the Forest's Sensitive Species list. The pipeline requirement of a permanent open corridor provides a unique opportunity to develop habitat for these skippers and grasshoppers. Planting the corridor with plants preferred by these Sensitive Species has the potential to increase the habitat and local range for these two species. Rehabilitation of disturbed sites is required under various BMP guidelines. Use of specific plant species has no additional problems. Results would be immediate in stabilizing the local habitat and location would be in the pipeline.

Miti-gation Group	Related Forest Plan Goals and Objectives	Mitigation Activity	Location	Amount	Treatments in 50 year Period	Resource Benefit	Rationale
Wetlands Aquatic	**Riparian Areas**: Maintain or enhance the Characteristics of riparian areas, wildlife habitat, and fish habitat near or within riparian ecosystems (WIN 4-6). Riparian area management is designed to protect soil, water, wetland, floodplain, wildlife, and fish and resource values associated with riparian vegetative communities; maintain or improve water quality, wildlife habitat and fish habitat near or within riparian ecosystems (WIN 4-136, 139; RR 4-2; UNF IV-59) **Fisheries:** protect, maintain and, where appropriate, enhance the productivity of fish habitat to provide for populations of resident and anadromous fish (UNF IV-43; RR 4-2). High standards of water quality in terms of temperature, turbidity, and bank stability for fisheries (WIN 4-6, 4-139). **Aquatic ecosystems**: restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands... maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. (NWFP ROD B-9) **ACS objectives** 1, 2, 3, 4, 5, 8	Repair Stream Crossing	Winema NF, Spencer Creek	1 project	1	Fisheries and aquatic habitats	Mitigation-Indirect: The proposed pipeline will cross Spencer Creek upstream of Buck Lake. This ford is at the uppermost reach of the perennial portion of Spencer Creek which is occupied by redband trout. Spencer Creek has been identified by NMFS through the FERC re-licensing process for the Klamath River hydro facilities, as habitat for Federally listed Southern Oregon/Northern California Coast Coho salmon. Additionally, once fish passage is provided through the Klamath River hydro facilities, steelhead will re-colonize Spencer Creek. The pipeline crosses SONC Coho habitats at other locations in other watersheds along the proposed pipeline route, possibly impairing habitat quality or reducing available habitat. Improving habitat quality at Spencer Creek provides the opportunity to be pro-active in providing quality habitat for SONC Coho, mitigating for any detrimental effects to other SONC Coho habitats, while improving habitat for redband trout and other aquatic species. Spencer Creek appears on the Oregon DEQ 303(d) list as water quality impaired from increased sedimentation. Improvements at this location will immediately benefit all downstream aquatic habitats and the species associated with those habitats.
			Rogue River NF, Little Butte Creek	32 Stream crossings (see notes in road decommissioning)	1		Restoring stream crossings reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting as a mitigation which will help offset the impact of shade removal at pipeline R/W crossings.
		Stream Simulator Culverts Placement; Remove existing culverts and replace with stream simulator culverts	Umpqua National Forest	5 crossings	1	Fisheries, aquatic biota and connectivity	Restoring stream crossings reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting as a mitigation which will help offset the impact of shade removal at pipeline R/W crossings.
		In-Stream Large Woody Debris Placement	Winema NF, Spencer Creek (new project)	1 mile	1	Fisheries and aquatic habitats	Over the last century, many streams with high aquatic habitat potential have become simplified, and therefore, have a reduced capacity to provide quality habitat. Riparian stands have decreased health and vigor, resulting in increased time to develop large tree structure for wildlife, stream shade, and future instream wood. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. The BLM completed placement last year on 3 miles of Spencer Creek below this reach. Addition of this segment would complete the stream rehabilitation on the reach of Spencer Creek where the project occurs. Logs from the PCGP Right of Way will be used for the project. An estimated 75 pieces are needed. A helicopter will be used to place the logs.
			Rogue River NF, SF Little Butte Creek (new project)	1 mile	1		
		Riparian Planting	Winema NF, Spencer Creek (new project)	0.5 miles	1	Riparian vegetation and habitats	Spencer Creek just upstream of Buck Lake. This is a meadow site that has lost streamside vegetation and has compacted soils. There is an overall need to restore health and vigor to riparian stands by maintaining and improving riparian reserve habitat. Shade provided by the plantings will contribute to moderating water temperatures in Spencer Creek. Root strength provided by new vegetation will increase bank stability, decrease erosion and sediment depositions to Spencer Creek and provide habitat for species that use riparian habitats.

Miti-gation Group	Related Forest Plan Goals and Objectives	Mitigation Activity	Location	Amount	Treatments in 50 year Period	Resource Benefit	Rationale
Grazing	**Riparian Areas:** Maintain or enhance the Characteristics of riparian areas, wildlife habitat, and fish habitat near or within riparian ecosystems. (WIN 4-6). Water bodies, stream courses, and wetlands, their riparian vegetation, and the immediately adjacent upland areas will be managed to stabilize stream channels: prevent soil erosion: and maintain or improve water quality, fish habitat, recreation opportunities, and riparian/ wetland habitat for dependent fish and wildlife species and dependent aquatic species. (WIN 4-16) Riparian area management is designed to protect soil, water, wetland, floodplain, wildlife, and fish resource values associated with riparian vegetative communities (WIN 4-136); maintain or improve riparian areas associated with Class I, II and III streams and with lakes (WIN 4-139) **ACS Objectives: 3, 4, 5, 8, 9**	Fence construction and cattle guards	Fremont-Winema NF, Clover Creek Road. Buck-Indian Allotment	6.4 Miles	1	Wetland and aquatic habitats. Visual resources, public safety.	This fence would serve to divide the Buck Indian Allotment into pastures north and south at Clover Creek Road. This fence would keep cattle from grazing newly revegetated areas in the Right of Way corridor, including areas where the corridor crosses Spencer Creek, thus helping to ensure that erosion control and revegetation objectives are met. It will also serve to separate anticipated increased cattle grazing of the ROW from the highway; greatly reducing a safety hazard for vehicles traveling the Clover Creek road. This fence would require 7-9 cattle guard crossings for Forest Roads intersecting the fence

Miti-gation Group	Related Forest Plan Goals and Objectives	Mitigation Activity	Location	Amount	Treatments in 50 year Period	Resource Benefit	Rationale
Visuals	**Winema NF:** Provide attractive. visually pleasing settings, emphasizing appearance of areas seen from major travel .routes,-use areas, and bodies of water (LRMP 4-13) **Foreground Retention:** The primary emphasis for this intensity is to retain the natural-appearing condition of the foreground areas. The retention visual quality objective means that activities may only repeat whatever form, line, color, and texture are frequently found in the characteristic landscape. Changes in their qualities--such as size, amount, intensity, direction, and pattern-may not be evident (WIN MA 3A, LRMP 4-103, RR MA 6A, LRMP 4-72). **Foreground Partial Retention:** The goal is to provide attractive scenery that is slightly altered from a natural condition as viewed in the foreground . Activities may repeat or introduce form, line, color, or texture common or uncommon to the characteristic landscape, but changes in their qualities of size, amount, intensity, direction, and pattern must remain visually subordinate to the visual strength of the characteristic landscape (MA 3B; LRMP 4-107, RR MA 6B, LRMP 4-86).	Stand density and fuels treatments for visual purposes on 50-500 foot wide area (Avg. 300) feet wide for length of corridor along Clover Creek Road (estimated 110 Acres).	Winema National Forest, Clover Creek Road	Estimated 110 acres-50-500 foot wide zone along the timbered edge of the PCGP corridor on the Clover Creek Rd.	1	Soften the visual effect of the hard edge created along the timbered boundary of the PCGP along the Clover Creek Road.	The PCGP will create a hard line along the timbered edge of the corridor that does not fit with the visual objectives for the Clover Creek Road or the Dead Indian Memorial Highway. Thinning and fuels treatments can be used to soften the edge to a more natural appearing texture by restoring stand density to more natural levels and creating small openings that are consistent with landscape. Thinning of commercial sized material will be accomplished with a commercial timber sale. The mitigation is intended to supplement funding for the non-commercial part of that work for visual purposes that could not otherwise be accomplished.
		Note that extensive mitigations are proposed within the PCGP Corridor for visual purposes at the PCGP crossing of the Big Elk Road and the Pacific Crest Trail on the Rogue River NF, and at the Dead Indian Memorial Highway crossing and along the Clover Creek Road on the Winema NF. These mitigations occur within the PCGP corridor and part of the Aesthetic Management Plan for the project, so they are not included as part of the Mitigation Plan or funding for activities that occur outside of the PCGP Corridor.					

Winema National Forest

Forest Plan Objectives and Watershed Analysis Recommendations

This report adopts and supplements the existing FERC mitigation plan found in Appendix L of the FERC FEIS for the Winema National Forest to support Forest Service decision making. Land allocations affected by the PCPG are shown in Table 2, below.

Table 2: Land Allocations Affected by the PCGP, Winema NF

LSR	Matrix	Riparian Reserves
0	6.09	0.08 Miles
Source: FERC FEIS Table 4.7.4.2-1, page 4.7-72		

Spencer Creek is a Tier 1 Key Watershed in the NWFP. Reduction of road density is a Standard and Guideline (S&G) for Key Watersheds (USDA FS; USDI BLM 1994b p. C-7) Watershed restoration recommendations are found in the Spencer Creek Watershed Analysis (WA) (1995). The Spencer Creek WA noted that road density in the watershed is negatively affecting wildlife habitat (USDA FS WNF 1995 p. 4.3). The Spencer Creek WA also noted that road density, stream temperature, fine sediment and low flows negatively impacted aquatic habitats in Spencer Creek(USDA FS WNF 1995 Executive Summary). After the FERC FEIS was released, the Winema National Forest completed their forest travel management planning process. This served as a catalyst to reexamine mitigation proposals associated with the PCGP in the Spencer Creek drainage. The following changes in the mitigation plan for the PCGP were developed after reviewing the FERC FEIS, Travel Management recommendations and the recommendations of the Spencer Creek WA.

Proposed Mitigation Actions

Table 3 displays the relationship between the PCGP impacts and proposed mitigations.

Table 3: Relationship between PCGP Environmental Consequences and Proposed Mitigations

PCGP Environmental Consequences[1]	Off-Site Mitigation (not in the PCGP Corridor)
Wildlife habitat impacts: fragmentation and edge effects created by corridor (Direct and indirect effects)	Decommission roads to reduce road density. Reestablish native vegetation to reestablish wildlife habitat.
Watershed impacts: Loss of LWD and riparian vegetation at stream crossings, potential sediment transport into aquatic systems, residual soil displacement and compaction. (Direct and indirect effects)	Replant riparian vegetation, Instream LWD and boulder project, Fencing to keep cattle out of corridor and adjacent streams, Harden ford at Buck Lake, Decommission roads to reduce soil compaction and erosion in watershed
Visual impact: corridor edge along major travel routes (Direct effect)	Soften edge by manipulating stand density and creating small openings typical of landscape.
1: Source: FERC FEIS Chpt. 4, Environmental Consequences on Federal Lands, various sections	

The following changes in the mitigation plan for the PCGP are intended to address objectives of the Winema NF LRMP as amended and the Spencer Creek WA. Maps of the project areas are attached (See Figure 1 and 2).

Riparian Plantings:
This is a meadow site along a .77 kilometer reach of Spencer Creek just upstream of Buck Lake (T38S R5E sec 11) that has lost streamside vegetation and has compacted soils. There is an overall need to restore health and vigor to riparian stands by maintaining and improving riparian reserve habitat. Shade provided by the plantings will contribute to moderating water temperatures in Spencer Creek. Root strength provided by new vegetation will increase bank stability, decrease erosion and sediment depositions to Spencer Creek and provide habitat for species that use riparian habitats. This is responsive to Aquatic Conservation Strategy objectives 3, 4, 5, 8 and 9.

In-Stream Large Woody Debris Placement:
Over the last century, a 1mile reach of Spencer Creek (T38S R6E sec 18) with high aquatic habitat potential has become simplified, and therefore, has a reduced capacity to provide quality habitat. Riparian stands have decreased health and vigor, resulting in increased time to develop large tree structure for wildlife, stream shade, and future instream wood. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time (Tippery, Jones et al. 2010). The BLM completed placement last year on 3 miles of Spencer Creek below this reach. Addition of this segment would complete the stream rehabilitation on the reach of Spencer Creek where the project occurs. Logs from the PCGP Right of Way will be used for the project. An estimated 75 pieces are needed. A helicopter will be used to place the logs. This is responsive to Aquatic Conservation Strategy objectives 2, 3, 4 and 5.

Interpretive sign placed at the dispersed campsite below Buck Lake:
Continued recreational dam building occurs at this location resulting in negative impacts to stream morphology and riparian habitat impacting fish and the only known Upper Klamath Basin population of Giant Pacific Salamander. There is a need to educate the public as to the detrimental effects of this dam building action and this would best be served by installation of an informational sign to reach those parties utilizing the site.

Stand Density Reduction:
The PCGP along the Clover Creek Road will create a hard visual "edge" against the timbered side of the corridor. This mitigation project would soften the edge effect by thinning the stand edge at widths varying from 50-500 feet and creating small openings consistent with the surrounding landscape. Approximately 110 acres will be thinned along the timbered edge of the corridor to reduce the visual impact of the project.

Road Obliterations in the Spencer Creek Watershed:
Reduction in road density is a central recommendation of the Spencer Creek WA. The objective of road decommissioning for this project is to reduce road density and accelerate the revegetation of the decommissioned roads with trees to reduce negative impacts of roads on wildlife habitat and aquatic environments. Some natural-surface roads have poor drainage that can lead to erosion and increased

sediment in nearby streams (Trombulak and Frissell 2000). Road obliteration can improve drainage and to reduce chronic sediment input to the stream systems (Madej 2000; Switalski, Bissonette et al. 2004; Tippery, Jones et al. 2010). This mitigation also offsets the impacts of soil compaction and displacement within the construction right-of-way by reducing compaction in the decommissioned roadbeds. Table 4 below compares miles of roads decommissioned with impacts of the PCGP corridor on riparian reserves, acres in degraded soil condition and number of stream crossings. Likely benefits of road decommissioning include increased infiltration of precipitation, reduced surface runoff, and reduced sediment production from surface erosion (Switalski, Bissonette et al. 2004). Where roads are decommissioned within riparian areas, riparian vegetation may be reestablished. Approximately 5.2 miles or 12.6 acres of proposed decommissioning occur within riparian reserves.

Approximately 29.3 miles of roads are currently open that can be decommissioned. Table 5 below shows the reduction in road density associated with implementation of the proposed mitigation plan. Road densities decrease at all scales with this mitigation. The greatest reductions in road density occur within ¼ mile of the PCGP corridor, showing that mitigations are associated with the impact of the project. Although an extensive erosion control plan and best management practices are incorporated in the PCGP, it is likely that 20-30% (15-25 acres) of the 78 acres cleared in the R/W and Temporary Extra Work Areas (TEWAs) on the Winema NF will remain in a degraded soil condition upon completion of the project because of displacement and residual compaction, thus necessitating some form of mitigation (FERC 2009 p. 4.2-29). These effects are similar to those created by a road so decommissioning roads is a logical mitigation for these impacts. Impacts of roads on watershed values are well documented (Trombulak and Frissell 2000; Switalski, Bissonette et al. 2004). Decommissioning roads can substantially reduce sediment delivery to streams (Madej 2000; Keppeler, Cafferata et al. 2007). The proposed road decommissioning will increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the PCGP occur.

Assuming a 20 foot average road width, 29.3 miles of proposed road decommissioning will revegetate approximately 71 acres (29.3*5280*20/43560=52 Acres) that are currently native road surfaces in the Spencer Creek Watershed. A comparison of project watershed impacts and corresponding mitigations is shown in Table 4 below. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (USDA FS; USDI BLM 1994b p. B-11, C-7).

Table 4: Comparison of PCGP Effects and Proposed Road Decommissioning: Spencer Creek Tier 1 Key Watershed

Winema NF	Miles in Watershed	Miles in Riparian Reserves	Acres in Degraded Soil Condition / Acres Restored	Stream Crossing
PCGP Corridor	6.09[1]	0.08[1]	15-25 degraded[2]	1 Class II[3] 5 Class IV
Roads Decommissioned[4]	29.3	5.20	71 Restored	25 Class IV

Sources:
1. FERC FEIS Table 4.7.4.2-1, page 4.7-72
2. FERC 2009, p 4.2-29
3. FERC 2009, Table G-4, page G-29
4. USFS GIS Analysis, (See Appendix)

Comparison of PCGP Effects and Proposed Road Decommissioning: Spencer Creek Tier 1 Key Watershed

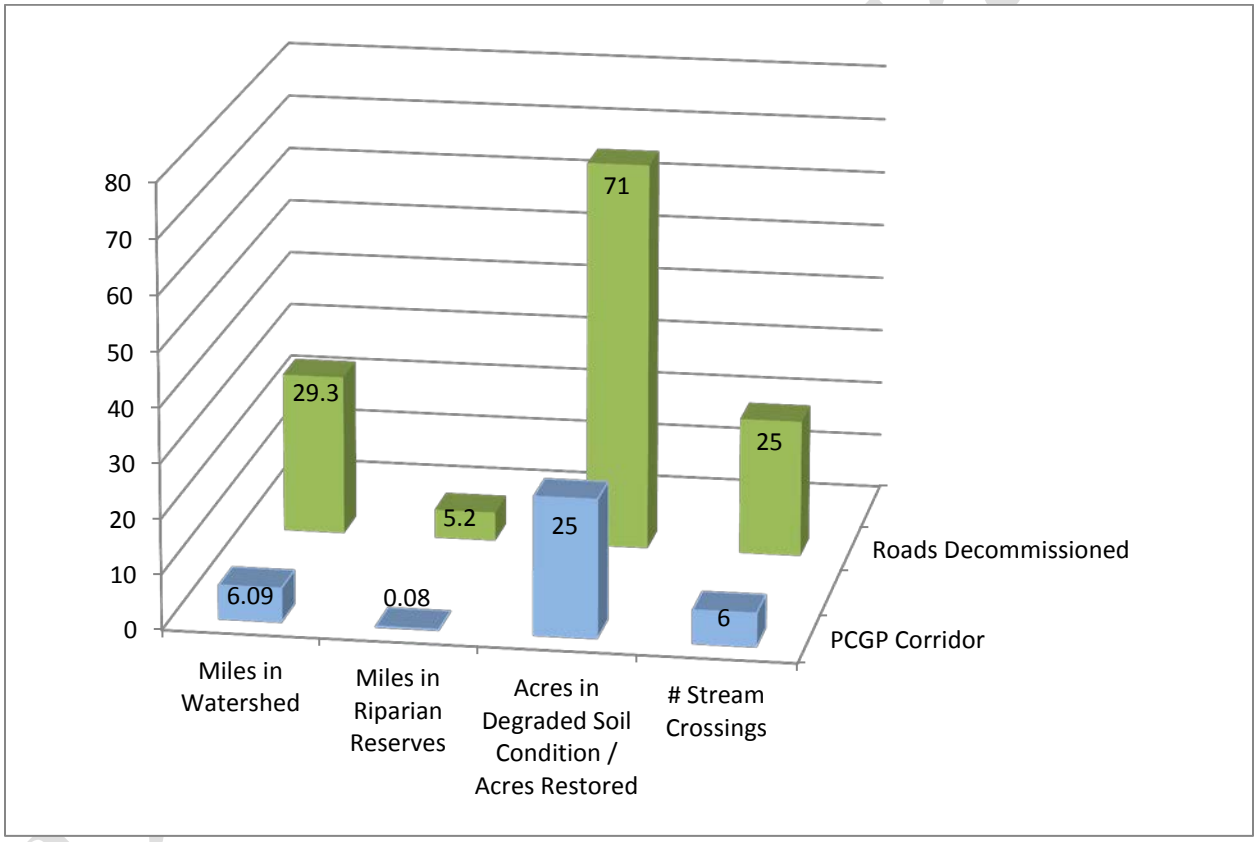
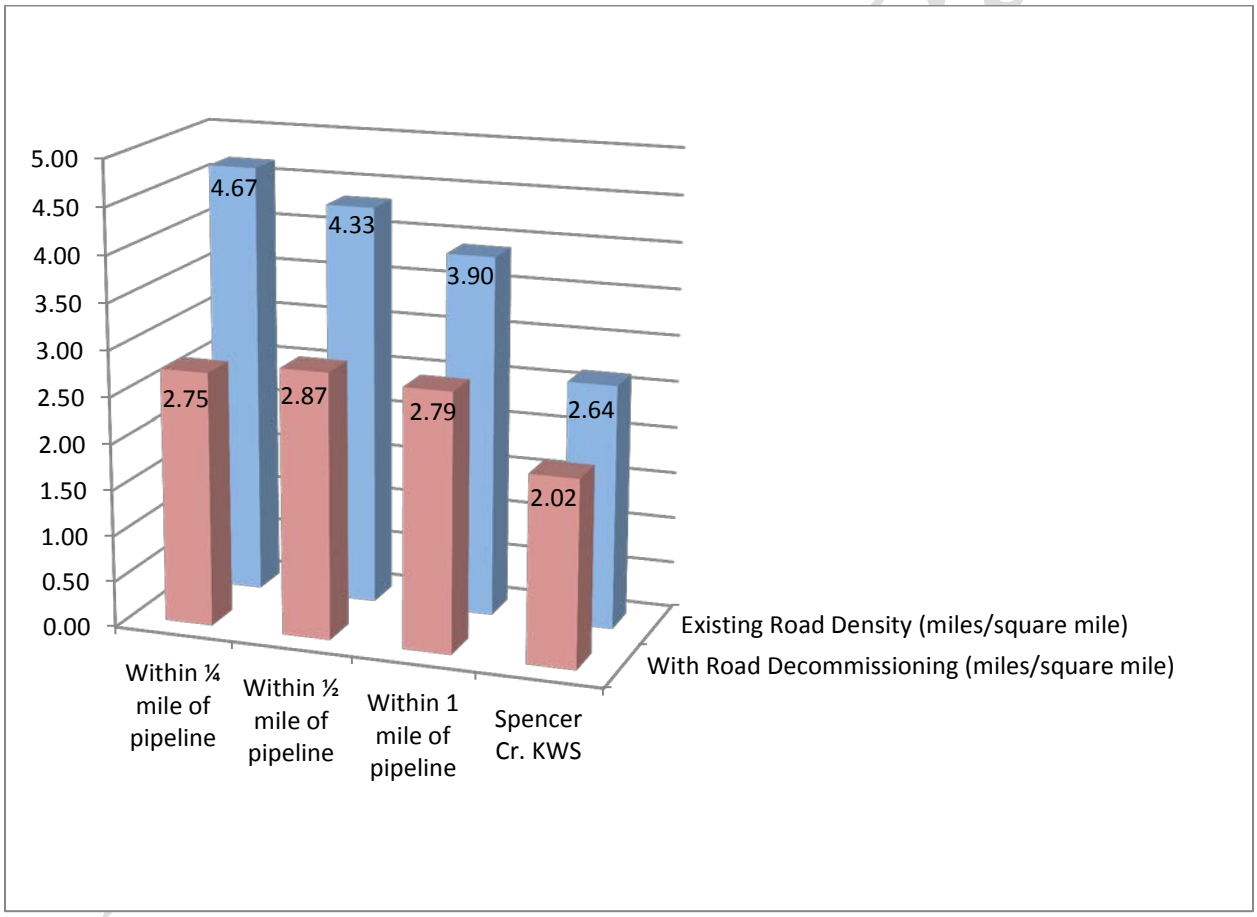


Table 5: Change in Road Density with Implementation of Mitigation Plan: WNF Spencer Creek Tier 1 Key Watershed

Winema NF	Current Condition (miles/square mile)	With Road Decommissioning (miles/square mile)	Change in Road Density with Decommissioning (miles/square mile)
All Roads, Spencer Cr. KWS (NFS only)	2.64	2.02	-0.62
Within 1 Mile of Corridor	3.9	2.79	-1.11
Within 1/2 mile of Corridor	4.33	2.87	-1.46
Within 1/4 mile of Corridor	4.67	2.75	-1.92
Source: FS GIS Analysis, Road Density Analysis,(See Appendix)			

Change in Road Density with Implementation of Mitigation Plan: WNF Spencer Creek Tier 1 Key Watershed



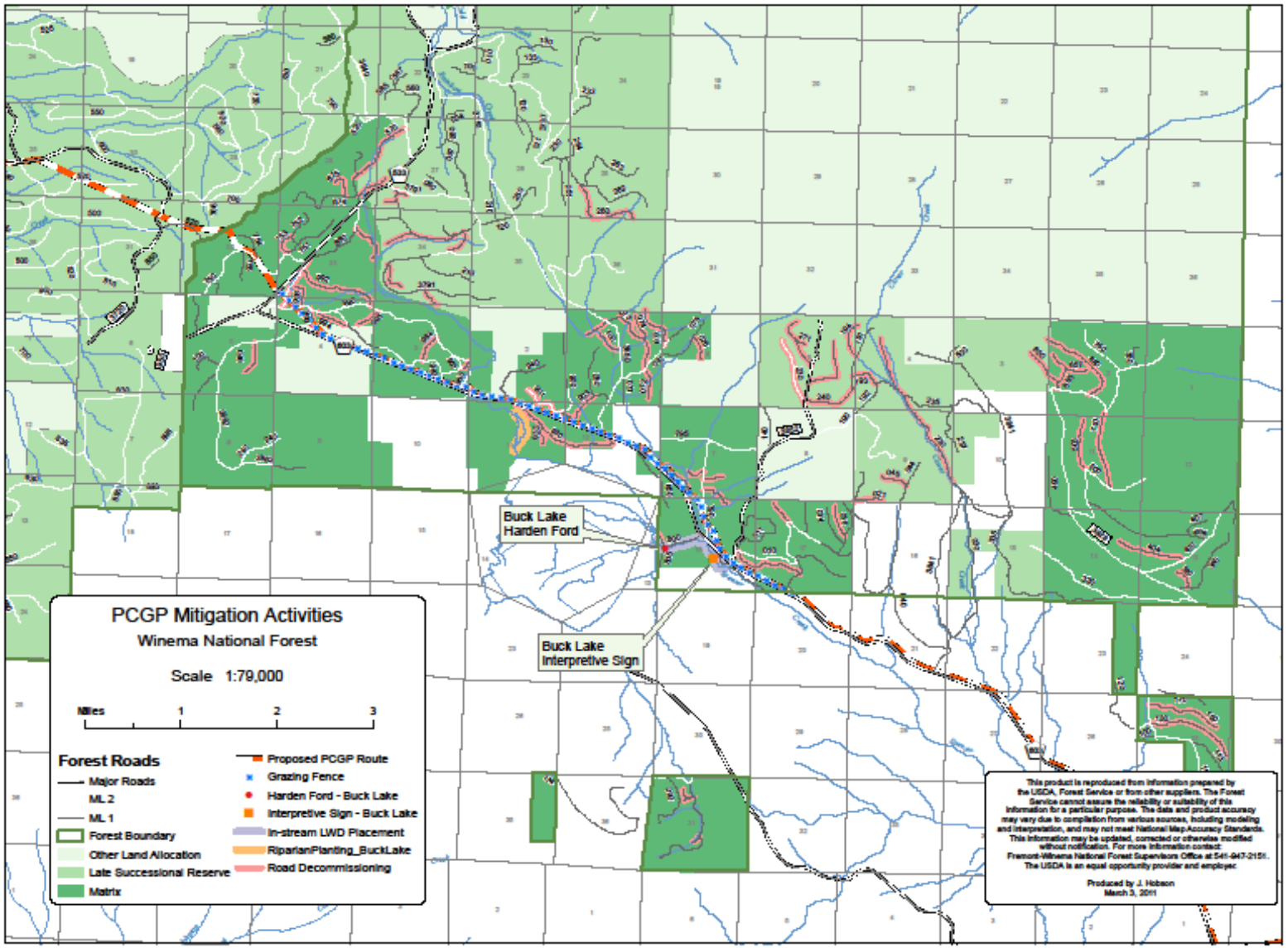
The following mitigations are a part of the FERC FEIS record, and are included here for reference.

Fencing
Construct allotment fencing along the south side of the ROW through Forest Service administered lands (approx. 6.4 miles). This fence would serve to divide the Buck Indian Allotment into pastures north and south at Clover Creek Road. This fence would keep cattle from grazing newly revegetated areas in the Right of Way corridor, including areas where the corridor crosses Spencer Creek, thus helping to ensure that erosion control and revegetation objectives are met. It will also serve to separate anticipated increased cattle grazing of the ROW from the highway; greatly reducing a safety hazard for vehicles traveling the Clover Creek road. This fence would require 7-9 cattle guard crossings for Forest Roads intersecting the fence. This is responsive to ACS Objectives 3, 4, 5 and 8.

Harden the ford at the crossing below Buck Lake:
Stream crossing improvements would improve aquatic habitat/connectivity and reduce sedimentation. The road accessing this location has been closed on the BLM and USFS. The private landowner and cattle cross the ford to access pasture from private land. The raw, unstable banks at this crossing allow fine sediments to enter the stream. This ford needs to be hardened and the banks re-vegetated and protected from grazing. The USFS side from the upper Spencer Creek dispersed campground needs more boulders or method of blocking 4-wheelers. Over time, these measures will reduce sediment contributions to Spencer Creek from these sites. This is responsive to ACS Objectives 2, 3 and 5.

Stand density and fuels reduction to achieve visual objectives:
The PCGP will create a hard line along the timbered edge of the corridor that does not fit with the visual objectives for the Clover Creek Road or the Dead Indian Memorial Highway (USDA-FS: RRNF LRMP 1990 p. 4-103). Thinning and fuels treatments can be used to soften the edge to a more natural appearing texture by restoring stand density to more natural levels and creating small openings that are consistent with landscape (Mattson 2009). Thinning of commercial sized material will be accomplished with a commercial timber sale. The mitigation is intended to supplement funding for the non-commercial part of that work for visual purposes that could not otherwise be accomplished or would not otherwise be required. An estimated 110 acres in a variable width strip 50-500 feet wide along the east side of the corridor would be treated in this manner.

Figure 1: PCGP Mitigation Plan, Winema NF



Rogue River National Forest

Forest Plan Objectives, Late Successional Reserve Assessment Recommendations and Watershed Analysis Recommendations

This report adopts and supplements the existing FERC mitigation plan found in Appendix L of the FERC FEIS for the Rogue River National Forest for the purposes of Forest Service decision making. The PCGP Corridor on the Rogue River National Forest lies entirely within LSR 227 and crosses two Riparian Reserves (See Table 6).

Table 6: Land Allocations Affected by the PCGP, Rogue River NF

LSR	Matrix	Riparian Reserves
13.58 miles	0.0	0.25 Miles
Source: FERC FEIS Table 4.7.4.2-1, page 4.7-72		

The LRMP objective for the LSR land allocation is to protect and enhance conditions of late-successional and old-growth forest ecosystems which serve as habitat for late-successional and old-growth related species including the northern spotted owl (USDA FS; USDI BLM 1994b p. C-9). Late Successional Reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem (USDA FS; USDI BLM 1994b p. C-11). New developments in LSRs such as pipelines are permitted by the Forest Plan where impacts can be minimized and mitigated (USDA FS; USDI BLM 1994b p. C-17). This report, in combination with the analysis in Appendix L of the FERC FEIS provides information for agency decision makers to determine whether project effects have been mitigated within the LSR land allocation.

Two mid-level analyses provide additional management recommendations for the Little Butte Creek watershed and the LSR land allocation. The Little Butte Creek Watershed Analysis provides information for aquatic and watershed restoration (USDA FS; USDI BLM 1997). The South Cascades Late Successional Reserve Assessment provides recommendations for management of vegetation to achieve the objectives of the LSR land allocation (USDA FS; USDI BLM; USDI FWS 1998).

Proposed Mitigation Actions

Portions of the Little Butte Creek watershed have high road densities that have negatively affected watershed condition and wildlife habitat (USDA FS; USDI BLM 1997). Key issues identified in the WA for aquatic habitats include temperature, habitat modification and sedimentation. Restoration recommendations to address these conditions include road decommissioning, riparian planting and thinning and instream projects that contribute to habitat complexity (USDA FS; USDI BLM 1997 Executive Summary, p. 10) Reduction in road density was identified as a method to improve watershed conditions (USDA FS; USDI BLM 1997 p. 182, 191, 205, Appendix F, K). High priority areas identified in the WA and proximity to the effects of the PCGP corridor were used to develop road decommissioning proposals.

The South Cascades Late Successional Reserve Assessment (1998) estimated that LSR 227 was approximately 16% late-successional or old-growth (LSOG) habitat at the time of the assessment, but had the capacity to be 75% late seral (USDA FS; USDI BLM; USDI FWS 1998 p. 51, p. 113). In order to achieve that objective, the assessment recommended a number of stand -level activities to accelerate the development of late-successional stand conditions including young stand thinning, creation of snags and recruitment of large woody debris (USDA FS; USDI BLM; USDI FWS 1998 p. 189-194).

Table 7 displays the relationship between PCGP effects and proposed mitigations.

Table 7: Relationship between project effects and mitigations

PCGP Environmental Consequences[1]	Off-Site Mitigation, not in the PCGP Corridor
Impact to the LSR land allocation	Reallocate matrix lands to LSR
Wildlife habitat impacts: Loss of LSOG and snag habitat in corridor, fragmentation and edge effects created by corridor (Direct and indirect effects)	Accelerate development of LSOG habitats by thinning young stands, creating snags, and placing LWD in adjacent stands. Accelerate development of interior stand habitat to reduce edge and fragmentation by decommissioning roads, revegetating decommissioned roads, precommercial thinning young stands
Watershed impacts: Loss of LWD and riparian vegetation at stream crossings, potential sediment transport into aquatic systems, residual soil displacement and compaction. (Direct and indirect effects)	Instream LWD and boulder project, Decommission roads to reduce soil compaction and erosion in watershed
1: Source: FERC FEIS Chpt. 4, Environmental Consequences on Federal Lands, various sections	

The following changes in the mitigation plan for the RRNF are intended to be responsive to these issues. Maps of the project areas are attached. See Figure 3:

Road Decommissioning:
The purpose of road decommissioning as mitigation for the PCGP is to offset potential watershed effects from construction and to reduce impacts on wildlife habitat from edge effects and fragmentation associated with the PCGP corridor. After the FERC FEIS was filed, the RRNF completed a Forest-wide transportation planning project to identify roads that are necessary for the Forest's designated transportation system. As a result of that decision and other access considerations, minor changes in the roads proposed for decommissioning were needed. The total number of miles proposed for decommissioning decreased by 1.3 miles from 54.5 miles to 53.2 miles. The number of stream crossings on roads proposed to be decommissioned increased slightly from 29 to 32 (See Table 9, below). Miles of roads proposed to be decommissioned in Riparian Reserves increased from 5.7 to 6.7 miles (USDA FS 2011). Current road density in LSR 227 is 3.3 miles per square mile. With the proposed road decommissioning, that would be reduced to 2.5 miles per square mile, a 24% reduction in road density measured in miles of road per square mile of LSR. Reduction in road density within ¼, ½ and 1 mile of the pipeline corridor are shown in the Table 9 (USDA FS 2011) . Roads proposed for decommissioning are shown in Figure 4, below.

Road Decommissioning Effects on Watershed Values**:** Although an extensive erosion control plan and best management practices are incorporated in the PCGP, it is likely that 20-30% (60-90 acres) of the 203 acres cleared in the R/W and TEWAs on the Rogue River NF will remain in a degraded soil condition upon completion of the project because of displacement and residual compaction, thus necessitating some form of mitigation (FERC 2009 p. 4.2-29). These effects are similar to those caused by a road, making road decommissioning an appropriate mitigation. Impacts of roads on watershed values are well documented (Trombulak and Frissell 2000; Switalski, Bissonette et al. 2004). Decommissioning roads can substantially reduce sediment delivery to streams (Madej 2000; Keppeler, Cafferata et al. 2007). The proposed road decommissioning will increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the PCGP occur. Assuming a 20 foot average road width, 53.2 miles of proposed road decommissioning will revegetate approximately 130 acres (53.2*5280*20/43560=130 Acres) that are currently native road surfaces in the Little Butte Creek Watershed. A comparison of project watershed impacts and corresponding mitigations is shown in Table 7 below.

Riparian Restoration**:** The PCGP crosses 1 intermittent and 1 perennial stream on the Rogue River National Forest affecting approximately 0.25 miles and 3 acres of riparian vegetation (FERC 2009 Table G-4, Table 4.7.4.2-1, page 4.7-72). Decommissioning roads in Riparian Reserves and at stream intersections has the effect of restoring connectivity within aquatic ecosystems and allowing riparian vegetation to become reestablished in riparian areas now occupied by road beds (Switalski, Bissonette et al. 2004). Approximately 6.72 miles with of proposed road decommissioning will occur in Riparian Reserves. A total of 32 stream crossings as shown in Table 10 below will be restored by proposed road decommissioning. As vegetation becomes reestablished at these crossings, it is expected that road-related sediment transport to aquatic ecosystems will be reduced (Madej 2000; Keppeler, Cafferata et al. 2007). This also supports ACS objectives 2, 3, 4, and 5, in the Little Butte Creek Key Watershed by reducing compaction and by revegetating approximately 14.3 acres of decommissioned roadbeds within Riparian Reserves.[2]

Table 8: Stream Crossings in Decommissioned Roads by Subwatershed and Stream Class, Little Butte Creek

6th Field Subwatershed	Class II	Class III	Class IV
Beaver Dam Subwatershed		**1**	**7**
Middle South Fork Subwatershed			**6**
Upper North Fork Subwatershed			**8**
Upper South Fork Subwatershed	**1**		**9**
Total	**1**	**1**	**30**
Source: USFS GIS, (See Appendix)			

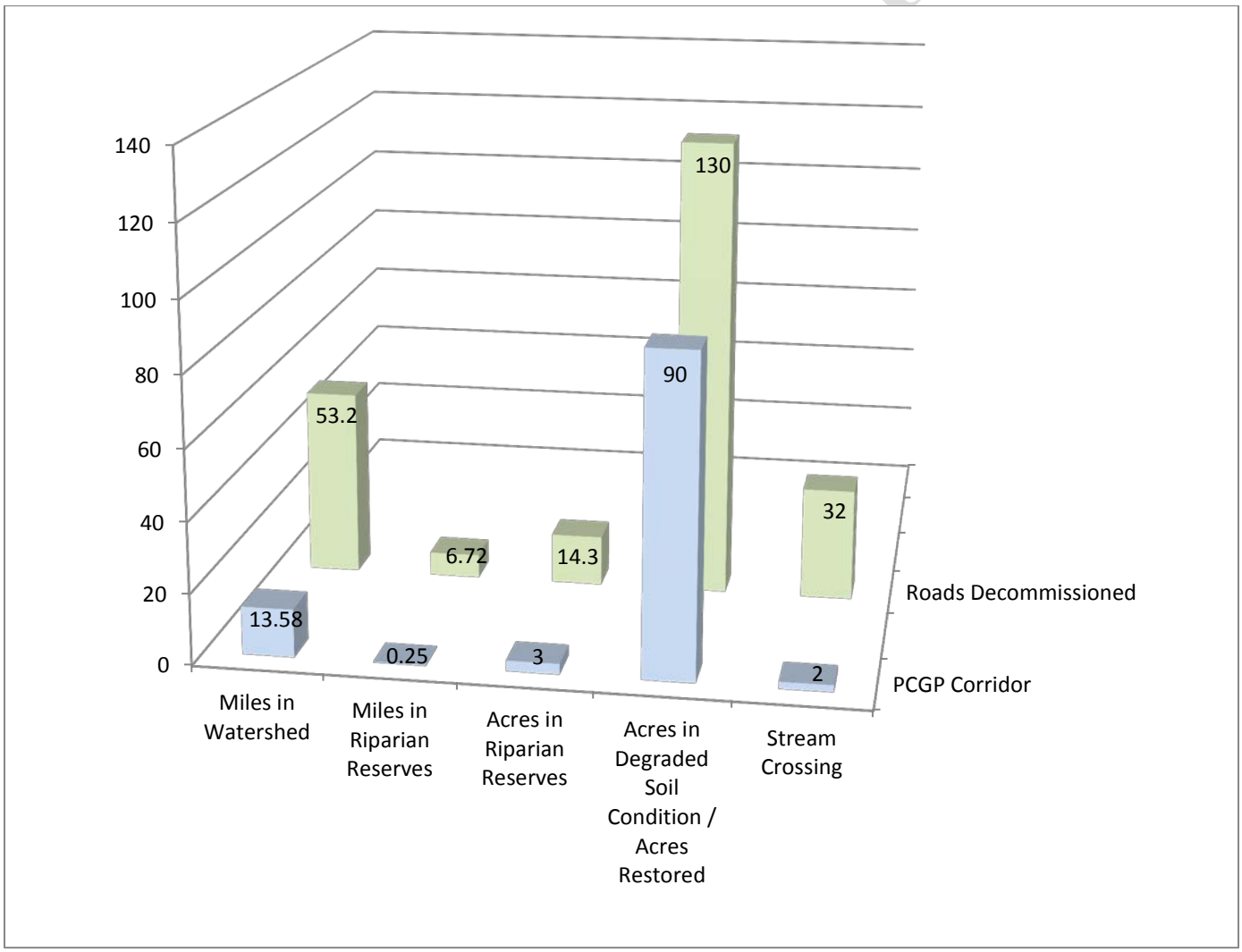
[2] Assumes a 20 foot average road width.

Table 9: Comparison of PCGP Effects and Proposed Road Decommissioning: Little Butte Creek Tier 1 Key Watershed

Rogue River NF	Miles in Watershed	Miles in Riparian Reserves	Acres in Riparian Reserves	Acres in Degraded Soil Condition / Acres Restored	Stream Crossing
PCGP Corridor	13.58[1]	0.25[1]	3[1]	60-90 degraded[2]	1 Class II[3] 1 Class IV
Proposed Decommissioned Roads[4]	53.2	6.72	14.3	130 Restored	1 Class II, 1 Class III 29 Class IV

Sources:
1. FERC FEIS Table 4.7.4.2-1, page 4.7-72
2. FERC FEIS, p 4.2-29
3. FERC FEIS, Table G-4, page G-29
4. USFS GIS Analysis, (See Appendix)

Comparison of PCGP Effects and Proposed Road Decommissioning: Little Butte Creek Tier 1 Key Watershed



Road Decommissioning Effects on Wildlife Habitats: Although the PCGP has been routed to avoid key wildlife habitats as much as possible, the project will create edge effects that may impact interior stand microclimates and cause habitat fragmentation with LSR 227 that cannot be avoided (FERC 2009 p. 4.4-41).

Edge: Edge is the effect of an opening on microclimate in adjacent stand (Hunter Jr. 1990; Chen, Franklin et al. 1993). Edge effect introduced by roads is highly variable and depends on aspect, road width, vegetation crossed and other variables. Edge effects are greatest when there is a high contrast in structure and composition between a newly created opening and the adjacent landscape (Harper, Macdonald et al. 2005 p. 768). Thus, edge effects are greatest when they impact interior stand habitats of older trees and least when the new opening is similar to the surrounding landscape such as adjacent to an existing road or in a recent clearcut

Decommissioning roads with appropriate restoration measures would presumably reverse edge and habitat fragmentation caused by existing roads and create habitat for a variety of animals (Switalski, Bissonette et al. 2004). The effect of edge reduction by road decommissioning is highly variable for the same reasons described for the edge effects created by constructing a road. Agency field experience has shown that road decommissioning reduces edge effect over time by revegetating road surfaces and eliminating road corridors. Revegetating selected roads in conjunction with density management proposed for adjacent plantations would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years as planted trees became pole sized (5-9 inches DBH and 20-40 feet tall). Published data on rate and pattern of edge reduction associated with decommissioning roads is not available (Baker 2011) but a comparison of the predicted beneficial effect of road decommissioning to edge effects associated with the PCGP corridor is useful, even if based on assumptions.[3] Using an assumed edge reduction of over time of 50 feet on each side of the road, decommissioning roads would reduce existing road-related edge effects on an estimated 640 acres (53.2*5280*100/43560)

Liner edge provides another measurement of edge effect. Approximately 13.58 miles of the PCGP corridor are located within LSR 227, creating 27.16 miles of new edge within LSR 227. Proposed road decommissioning will revegetate 53.2 miles of roads, removing approximately 106.4 miles of existing edge.

Fragmentation: Fragmentation can be described in several different contexts. Fragmentation in the context of impacts on the LSR land allocation is the process of reducing the size and connectivity of stands that compose a forest (USDA FS; USDI BLM 1994c Glossary, p. 7). The conversion of large tracts of old-growth forest to small, isolated forest patches with large edge areas can create changes in microclimate, vegetation species, and predator-prey dynamics (FERC 2010 p. 4-204). An assessment of fragmentation was conducted by FERC, but that assessment was not specific to LSR 227 with respect to patch size (FERC 2010 p. 4-198).

To provide an indication of the effects of the PCPG corridor and proposed road decommissioning on fragmentation, the Forest Service conducted a stand-level analysis considering stands that fell within 100

[3] This approach is consistent with CEQ Regulations for NEPA, 40 CFR 1508.22

meters of the proposed pipeline corridor. All stands that overlapped the 100 meter buffer were included in the analysis out to the stand edges beyond the buffer. The only changes examined in this analysis were natural growth and development of trees and the off-site mitigation activities. Natural events, such as wildfire and storms, were not modeled because of their stochastic nature and the relatively limited size of the analysis area. Within the modeled stands, it was assumed there would be no forest management harvest activities during the 60 years modeled beyond activities already planned. Future management activities would need to be consistent with the existing forest plan at the time the project is implemented.

Construction of the pipeline will result in the fragmentation of mature forest in LSR 227, and will increase the fragmentation index (ratio of edge: acres) in modeled stands (those within 100 meters of the pipeline) by about 1%.[4] After 60 years, normal stand growth will reduce this ratio by about 3%. With implementation of proposed road decommissioning the ratio of edge: acres will decrease about 34%. A decrease in the ratio of edge to opening means that patch sizes of forested areas has increased. LSR 227 currently has 1,445 patches of mature forest greater than 1 acre in size that lie within 100 meters of the edge of the PCGP corridor Pipeline construction increases fragmentation slightly by passing through and dividing eight of these patches, with a net increase of 5 patches. The current average patch size throughout the LSR is approximately 7 acres, and this is not projected to change within the next 60 years. With the proposed road decommissioning and road closures, the size of patches within 100 meters of the pipeline will increase to an average of 14.5 acres within 60 years. This is consistent with a reduction in the edge to opening ratio discussed above.

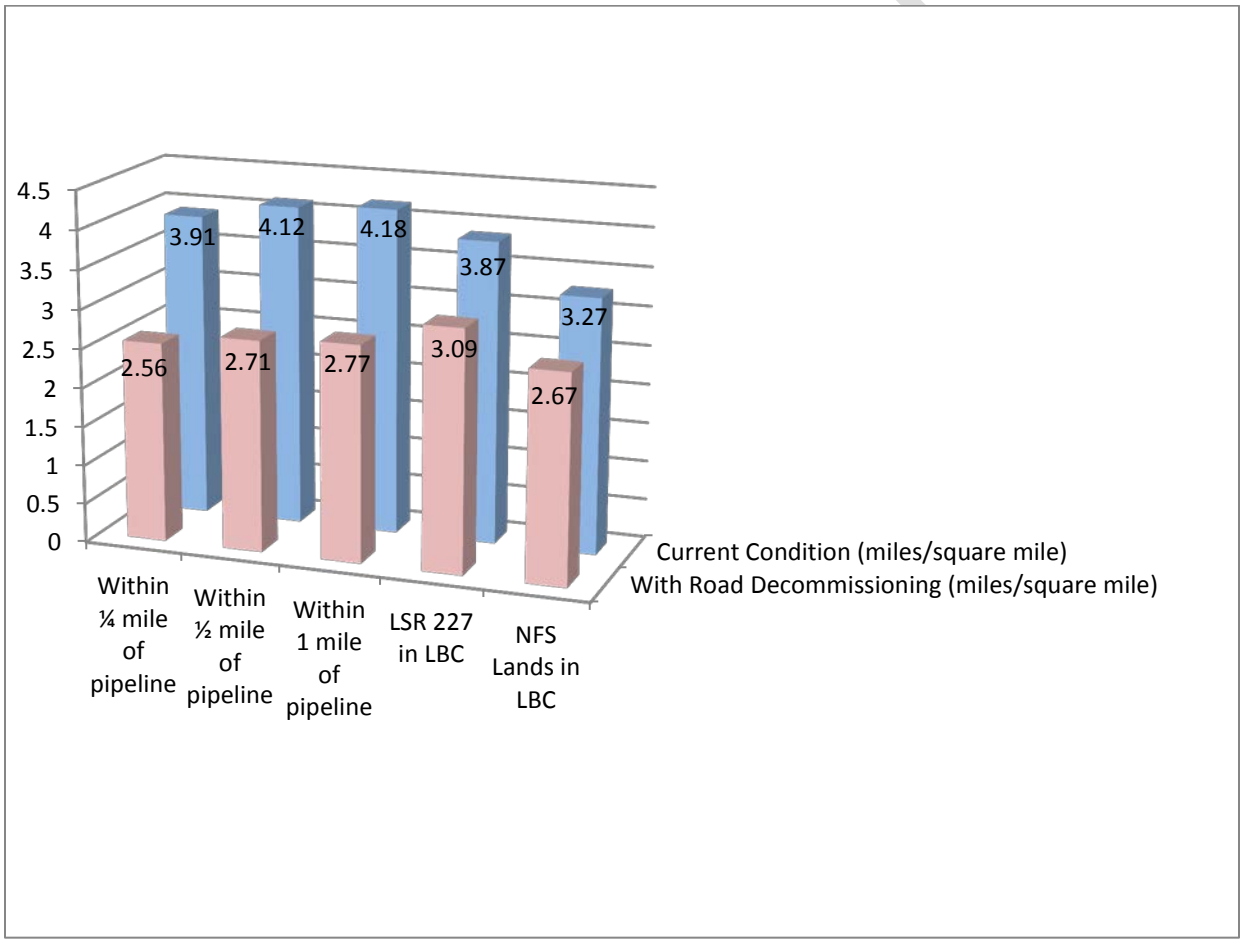
In terms of interior patches (mature forest areas that are at least one acre in size and at least 300 feet from a hard edge) there are currently 779 interior patches in LSR 227. Eight of these (about 1% of the interior patches) would be fragmented by the pipeline corridor. In 60 years, interior patches are projected to increase to 856 interior patches – a 9% increase from the current condition. With the proposed road decommissioning, the number of interior patches will increase by about 16% to 927, and the average size of the patches will increase from about 6.5 acres to 13.9 acres – about a 50% increase in size. (USDA FS; RRNF 2010)

[4] Changes in edge: area ratios are more meaningful as relative numbers rather than absolute values, so percentages are used to express changes in values.

Table 10: Change in Road Density with Implementation of Mitigation Plan: RRNF, LSR 227 in Little Butte Creek Tier 1 Key Watershed

Rogue River NF	Current Condition (miles/square mile)	With Road Decommissioning (miles/square mile)	Change in Road Density with Decommissioning (miles/square mile)
NFS Lands in LBC KWS	3.27	2.67	-0.6
LSR 227 in LBC KWS	3.87	3.09	-0.78
Within 1 mile of pipeline	4.18	2.77	-1.41
Within ½ mile of pipeline	4.12	2.71	-1.41
Within ¼ mile of pipeline	3.91	2.56	-1.35
Source: USFS GIS Analysis, (See Appendix)			

Change in Road Density with Implementation of Mitigation Plan: RRNF, LSR 227 in Little Butte Creek Tier 1 Key Watershed



Summary comparison of project effects or current condition and effect of proposed road decommissioning mitigation

	Road Density, LSR 227, miles / square mile[1]			Linear Miles of Edge				
PCGP Effect / Current Condition	3.87 (Current Condition)			27.16 miles created edge				
With Proposed Road Decom-missioning	3.09			106.4 miles edge removed				

Source:

1. **USFS GIS, Decommissioning Analysis (See Appendix)**
2. **FERC FEIS Table 4.7.4.2-1, page 4.7-72**
3. **FERC FEIS, Table G-4, page**

Table XX below provides a summary comparison Direct and indirect edge effects compared to effects of proposed mitigations are compared in Table XX below

RRNF, LSR 227	LSOG Acres	Total Acres, all age classes	Miles of Edge Created	Miles	
Direct Effects	67[1]	203[1]	13.58		
Indirect Effects-	874[2]				

Sources:

1. Table 2.1-1a, CMP, page L3-15, CMP
2. TABLE 4.3.5.3-13, page 4-206, FERC BA, 2010

Large Woody Debris (LWD

The purpose of placing LWD in old harvest units is to meet forest plan objectives for LSR. The primary management objective of LSR is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl (USDA FS; USDI BLM 1994b p. C-11). The South Cascades LSRA described a desired condition that includes LWD

ADD RECOVERY PLAN ACTIONS

WHEN WRITING ABOUT UMPQUA, HIGHLIGHT THAT ROAD DECOM NOT THAT BIG AN OBJECTIVE BECAUSE PART OF THE LAND IS MATRIX, AND NOT KEY WATERSHED.

LWD projects are necessarily limited by the number of pieces available from the corridor. The original proposal was based on preliminary estimates of available LWD from the corridor and did not account for pieces needed for corridor rehabilitation. As a result, the original proposal overestimated the acres that could be treated. Because of uncertainty in the number of pieces available projected treatment area is revised from 600 acres to an estimated range of 200-400 acres. Also, an instream project has been added which further reduced the number of pieces available for terrestrial LWD projects. Proposed LWD terrestrial units are shown in Figure 4, below.

In-stream Large Woody Debris, South Fork, Little Butte Creek:

This is a new mitigation project. Over the last century, many streams with high aquatic habitat potential have become simplified, and therefore, have a reduced capacity to provide quality habitat. Riparian stands have decreased health and vigor, resulting in increased time to develop large tree structure for wildlife, stream shade, and future instream wood. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time (Tippery, Jones et al. 2010). The proposed instream LWD project is shown in Figure 4, below.

Developed an Alternative Matrix to LSR Reallocation:

In response to scoping comments, an alternative matrix to LSR land allocation change has been developed that better matches the quality of habitat impacted by the PCGP. See Figure 3 below.

The purpose of this mitigation is to ensure that the Forest Plan objectives for Late Successional Reserve land allocation are achieved by adding acres from the matrix land allocation to LSR 227 to replace LSR acres impacted in the PCGP corridor. The Proposed Action would reallocate approximately 595 acres from matrix to LSR as shown in Figure 3 below. Scoping comments on the Proposed Action suggested that the matrix lands proposed for reallocation were of a lower quality habitat than that in the PCGP corridor and thus, may not adequately offset impacts to the LSR land allocation. In response to the scoping comments, the Forest Service developed an alternative proposal shown in Figure 3 that would reallocate approximately 512 acres from matrix to LSR. This alternative was developed to better represent types of habitat impacted in LSR 227 by the PCGP corridor. The Proposed Action and Alternative 1 are shown together in Figure 3 and compared in Tables 6, 7 and 8, below.

Compared to the Proposed Action, Alternative 1:

- Provides more contiguous habitat with fewer openings and less non-suitable habitat than the Proposed Action (See Figure 3 below).

- Provides 50 more acres of NSO suitable habitat than the Proposed Action as shown in Table 7, below.
- Provides 63 more acres of LSOG than the Proposed Action as shown in Table 6 Additionally, as shown in Table 6, the old growth component of the LSOG age class has substantially more acres in Alternative 1 than in the Proposed Action.

Based on Tables 6, 7 and 8, Alternative 1 clearly provides larger amounts of higher quality habitat than the Proposed Action to replace habitat lost in the PCGP corridor.

When acres reallocated from matrix to LSR are compared to the acres removed in the LSR by the PCGP, the Proposed Action reallocates approximately 2.5 times more acres from matrix to LSR than are cleared by the PCPP; Alternative 1 reallocates approximately 3 times more acres to LSR than are cleared. When impacts to NSO habitat in LSR are considered, the Proposed Action reallocates approximately 4 times more suitable NSO habitat to LSR than is removed by the PCPG; Alternative 1 reallocates approximately 4.7 times more suitable NSO habitat to LSR than is removed by the PCGP corridor. When impacts to LSOG in LSR are considered, the Proposed Action reallocates approximately 4 times as many acres to LSR as are removed by the PCGP; Alternative 1 reallocates approximately 5 times as many acres of LSOG to LSR as are removed by the PCGP(see Table 8, below).

Figure 2: Proposed Action and Alternative Matrix to LSR Land Reallocation, Rogue River NF

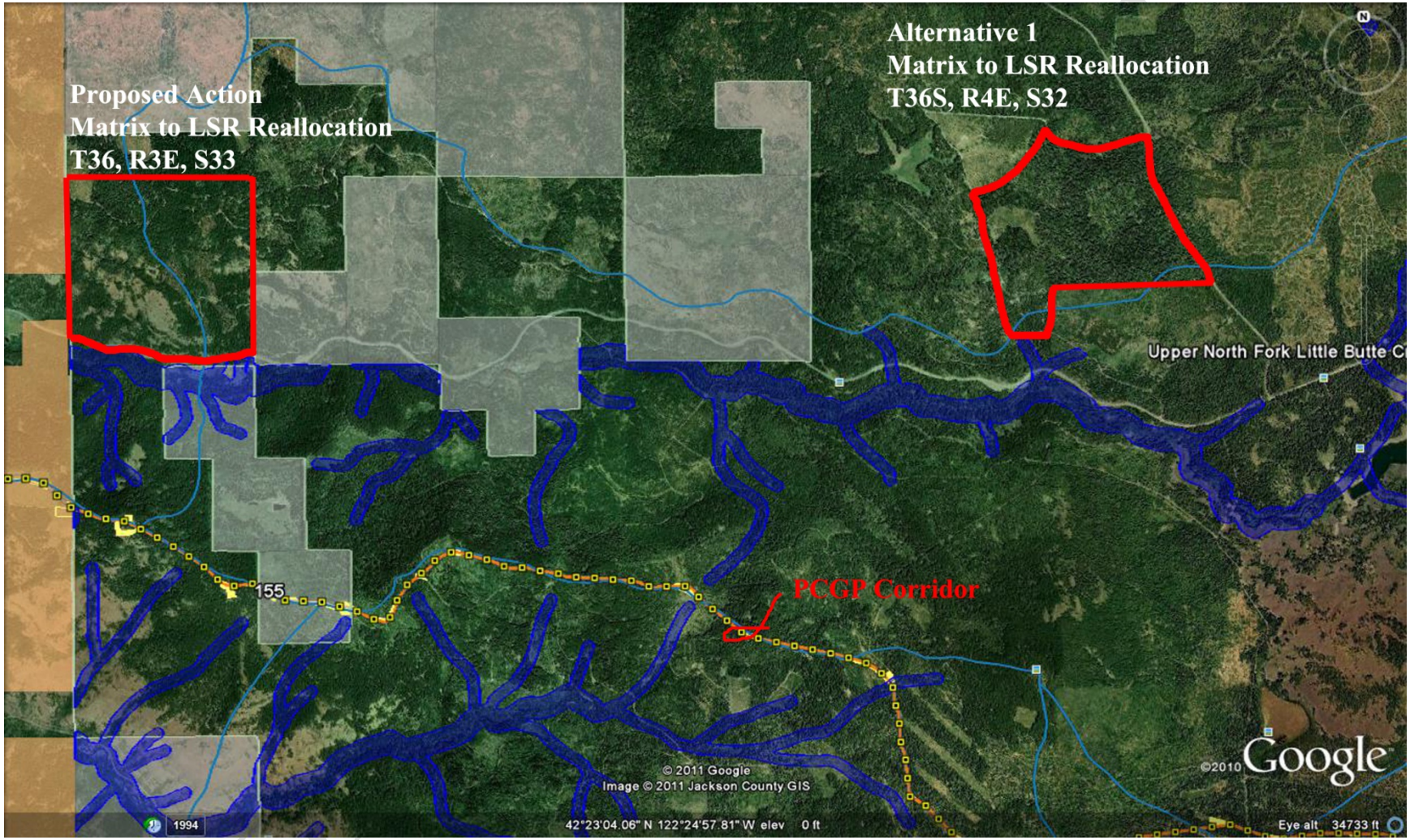


Table 11: Age Class Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 227

Rogue River NF	Total Late Successional and Old Growth (80+yrs)	Mid-Seral (40-80 yrs)	Regenerating Shelterwood and plantations (5-40 yrs)	Regenerating Forested Burned Area (0-40 yrs)	Open Meadow Habitat or non-forest	Total All Age Classes
Reallocation of Matrix to LSR Proposed Action (acres)[1]	270	0	53	155	115	593
Reallocation of Matrix to LSR Alternative 1 (Acres)[1]	333	0	179	0	0	512
Acres of Vegetation Cleared in LSR by PCGP Corridor (acres)[2]	67	10	90	0	36	203

Sources:
1. Cox, 2010. Age Class and NSO Habitat Acre Summary, Matrix to LSR Conversion (See Appendix)
2. FERC FEIS Appendix L, Table 2.1-1a

Age Class Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 227

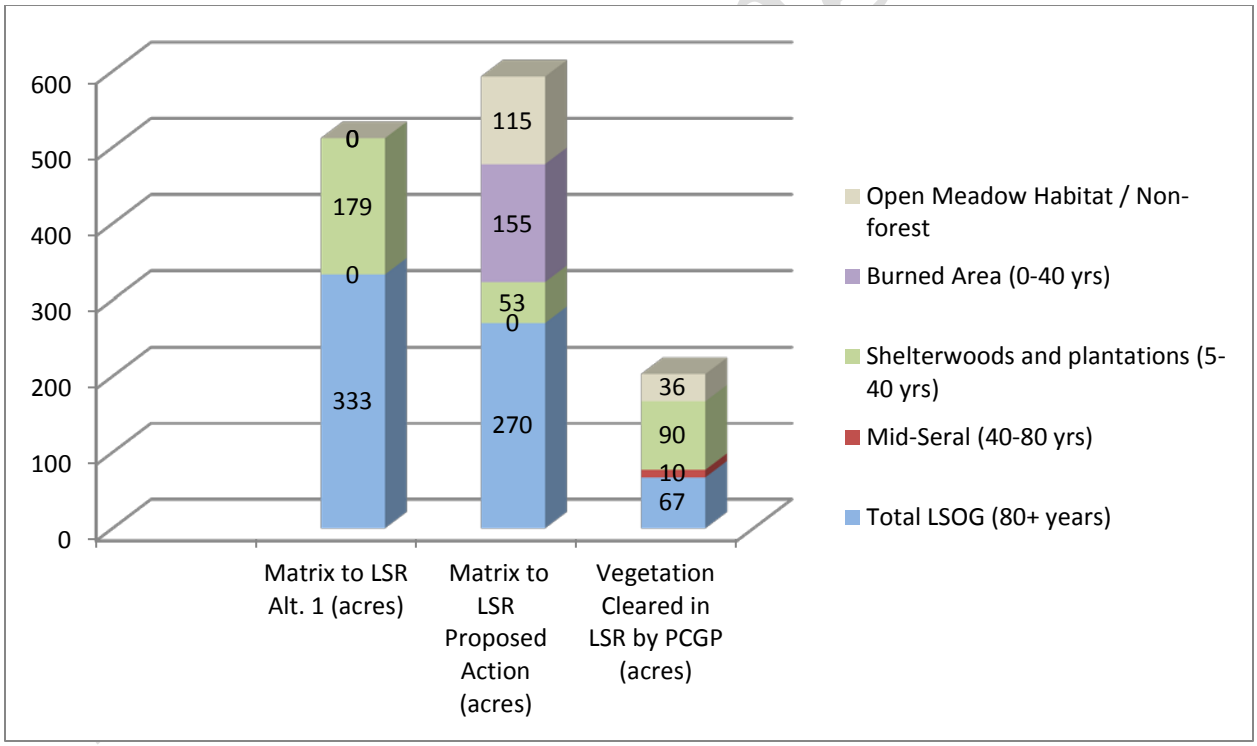


Table 12: NSO Habitat Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 227

	NSO Habitat Type			
Rogue River NF	**Suitable**	**Dispersal Only**	**Non-Suitable/ Capable but not currently suitable[3]**	**Total Acres**
Alternative 1 Reallocation of Matrix to LSR (Acres) [1]	**320**	**13**	**179**	**512**
Proposed Action Reallocation of Matrix to LSR (Acres) [1]	**270**	**0**	**323**	**593**
Habitat Cleared in PCGP Corridor and TEWAs[2] (LSR Acres)	**68**	**62**	**73**	**203**

Sources:

1. **Cox, 2010. Age Class and NSO Habitat Acre Summary, Matrix to LSR Conversion (See Appendix)**
2. **FERC Biological Assessment, Table 4.3.5.3-14, page 4-204. LSR 227, West Cascades Physiographic Provinces**
3. **In this comparison, the Forest Service lumped capable but not currently suitable and non-suitable habitat for simplicity of comparison with matrix to LSR reallocation. See Cox, 2010, in the appendix for a breakdown of acres.**

NSO Habitat Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 227

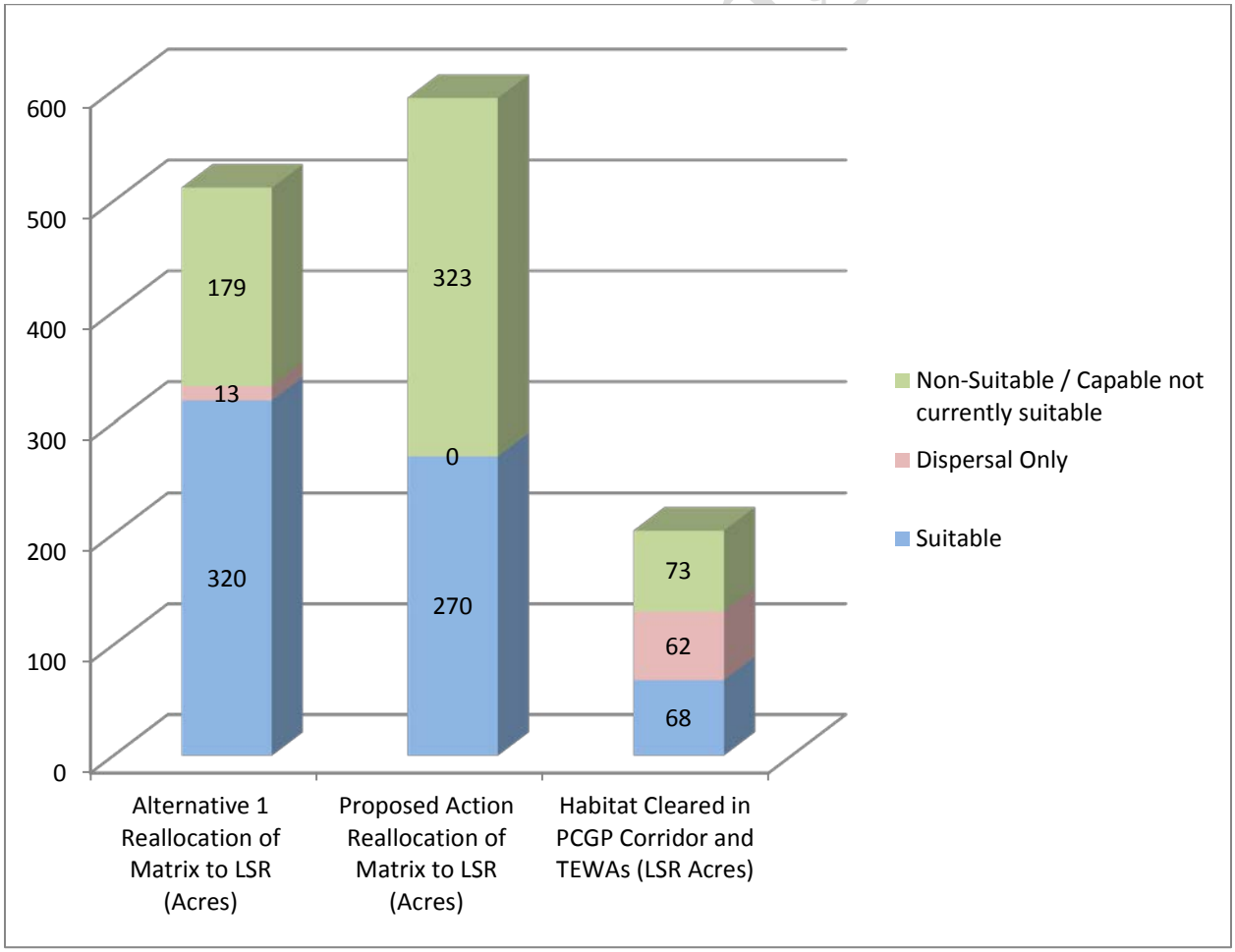


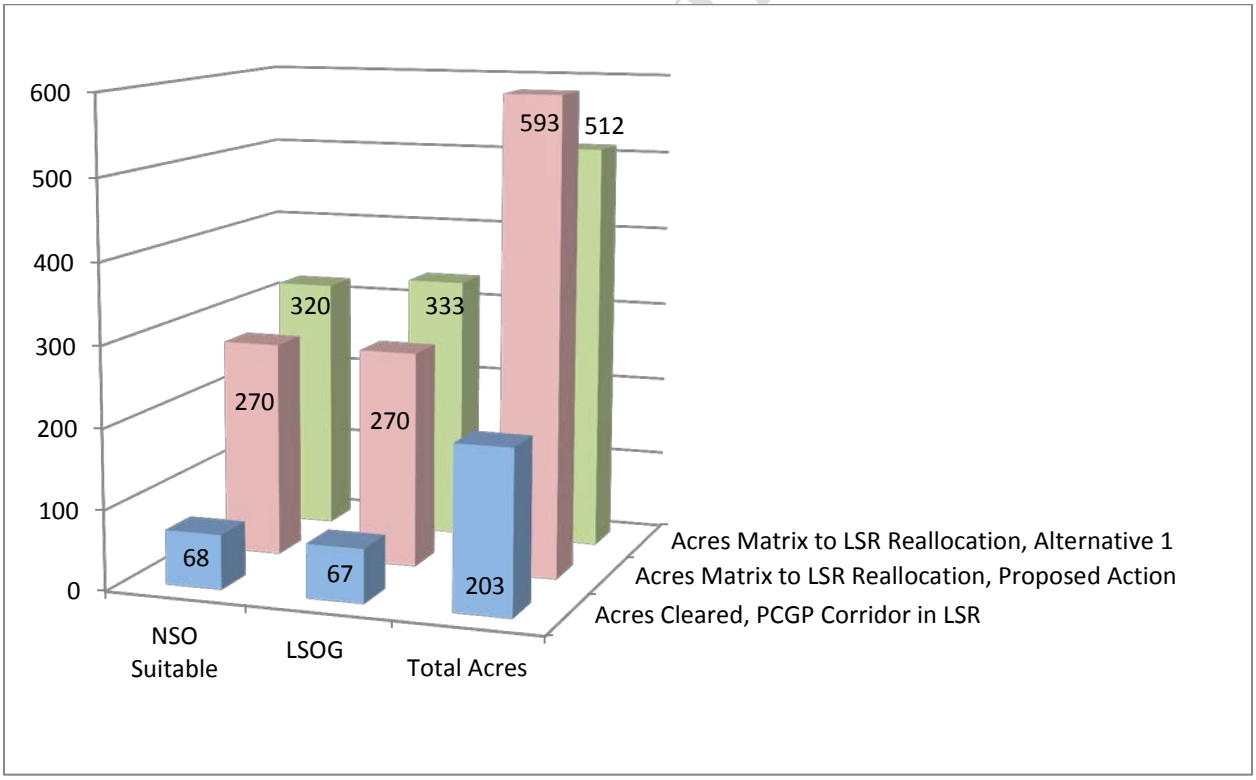
Table 13: Summary, NSO Suitable Habitat and LSOG: Comparison of Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 227

Rogue River NF	NSO Suitable Acres	LSOG Acres (80 Years+)	Total Acres
Acres Cleared, PCGP Corridor in LSR	68[1]	67[2]	203[2]
Matrix to LSR Reallocation, Proposed Action[3]	270 (Ratio acres reallocated to LSR NSO Suitable acres cleared: 4.0:1)	270 (Ratio acres reallocated to LSR LSOG acres cleared: 4.0:1)	593 (Ratio acres reallocated to total LSR acres cleared 2.9:1)
Matrix to LSR Reallocation, Alternative 1[3]	320 (Ratio acres reallocated to LSR NSO Suitable acres cleared: 4.7:1)	333 (Ratio acres reallocated to LSR LSOG acres cleared: 5.0:1)	512 (Ratio acres reallocated to total LSR acres cleared 2.5:1)

Sources:

1. FERC Biological Assessment, Table 4.3.5.3-14, page 4-204. LSR 227, West Cascades Physiographic Provinces
2. FERC FEIS Appendix L, Table 2.1-1a
3. Cox, 2010. Age Class and NSO Habitat Acre Summary, Matrix to LSR Conversion (See Appendix)

Summary, NSO Suitable Habitat and LSOG: Comparison of Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 227



Road Decommissioning (53.2 miles)

See Figure XX below for a map of proposed decommissioning projects.
Upland Terrestrial Restoration

Stand density (600 Acres): Precommercial thinning is proposed for overstocked plantations to accelerate the development of late-successional and old-growth forest characteristics in LSR 227. Managing stand density will increase growth rates, decrease susceptibility to stand replacing fire and diversify stand structure in otherwise relatively homogenous stands. This accelerated development will also reduce fragmentation and reduce edge effects and will help maintain the ability of these stands to respond to changed environmental conditions from either natural or human-caused disturbances. All 600 acres are within 0.5 miles of the pipeline right-of-way. Placing the off-site mitigation activities close to the actual pipeline corridor increases their effectiveness by impacting lands within, or near, the home ranges of individual animals and species impacted by the pipeline habitat changes. As the mitigations address ecological processes like edge effect, placing the mitigation within or near the edge impacts increases the effectiveness of the mitigation by restoring ecosystem structures and processes on some of the acres also impacted by the pipeline. Thinning young stands will, over time reduce existing edge effects. There is no precise way to estimate this edge effect reduction with available date since stands are at many different age classes, perimeters and and canopy closures. The estimated perimeter of the units proposed for thinning is approximately 3.0 miles. Assuming some edge reduction within 100 of the edge of these units, density management would reduce edge effects over time by an estimated 36 acres(3*5280*100/43560).

Fuels treatments for the slash generated by stand density management are decided on a case-by-case basis and rely on slash loading information as well as proximity to roads and other factors. Slash treatments may be as simple as lop and scatter to get the fuels in contact with the ground for more rapid decomposition, or they may involve piling and burning or removal of slash from the site.
Snag Creation (600 acres): Snag creation is proposed as a mitigation to replace snags lost in the pipeline right-of-way for habitat for cavity-nesting birds and denning sites for mammals (bats, bears, fishers, etc.). Snags will be lost from the pipeline corridor to facilitate pipeline construction or to mitigate safety hazards for construction workers.

Approximately 1200 snags will be created by blasting tops from live trees (preferably trees with existing decay that makes them more suitable for cavity-nesting birds and/or as denning sites) or by inoculating living trees with heart rot decay fungi. Sites selected for snag creation will be within ½ mile of the pipeline right-of-way to develop snag habitat within (or near) the home ranges of cavity excavators being displaced by the pipeline corridor. Sites will be in mid-successional stands or around the edges of early successional stands that are currently deficient in snags as defined by Plant Association Group for Cascade White Fir forests. Stand data for these plant associations (which is an indication of undisturbed forest snag levels) shows that these stands have an average of about four snags/acre in the 11-20 inch diameter range and an additional four snags/acre greater than 20 inches in diameter.

If the tree diameters in the stands prevent snag creation in the >20” diameter size class, additional snags in the smaller size class (11-20” diameter) will be created to make up for the deficit. For sites bordering

early successional stands, snags will be created within 100 yards of the stand boundary at the same trees/acre levels described above.

Large Woody Debris Placement in Plantations: Large wood placement in plantations is proposed to accelerate the development of late-successional and old-growth characteristics by restoring this habitat component to plantations where large woody debris (LWD) is lacking. Any wood used in this mitigation will come from the PCGP corridor. No additional trees outside the corridor will be harvested to provide large woody debris, so this mitigation is necessarily limited by the amount of LWD that can be provided from the corridor. LWD used in this mitigation will be staged at appropriate locations and placed with a helicopter. The standard for this mitigation is provided by the RRNF Plan and is noted for both soils productivity and wildlife habitat in numerous citations:

"At a minimum, a "moderate" amount of LWD will be left after project completion. The moderate range is 10-20 pieces of Class I and II logs and all Class III, IV and V logs…

The first priority in restoration with respect to LWD is to ensure that that the PCGP corridor itself meets Forest Plan standards after construction is completed. After LWD standards within the corridor have been met, any additional LWD would be available for placement in adjacent units identified below.

Large wood will be placed in plantations that are also receiving stand density management treatment. The large wood will be from trees cut from the pipeline corridor. Sites selected for down woody material placement will be within ½ mile of the pipeline right-of-way. As with the other off-site mitigations, placement of the mitigation activities close to the pipeline corridor can benefit species that are impacted by the vegetation changes within the corridor and will make these mitigations more effective. Sites will be in early successional stands that are currently deficient in downed wood (as defined by Plant Association Group for Cascade White Fir forests).

The large wood placement piece count / acre is expected to vary to account for some of the range in variability found across the landscape. For 11-20" diameter logs treatments will average about 10 pieces on each treated acre but densities will vary from 8 to 33 logs/acre. For 20"+ diameter logs an average of 5 pieces will be placed on each treated acre, but densities will vary from 3-12 logs/acre. Logs will be approximately 40' in length, and the specified diameter (11-20" and 20+") refers to the stem diameter at the midpoint of the 40' log.

Table XX below describes the proposed placement of CWD material. Unit numbers correspond to the attached map for CWD placement. Because piece counts of available wood are uncertain and highly variable a precise prediction of treatable acres cannot be made. With the limitations of available information, approximately 200 - 400 acres could be treated. Target numbers in Table XX below are upper bounds. Any increase in LWD in areas where LWD is deficient will be beneficial. If additional pieces of LWD and funds are available, additional units shown in Figure XX below may be treated.

Table 14: LWD Placement Objectives

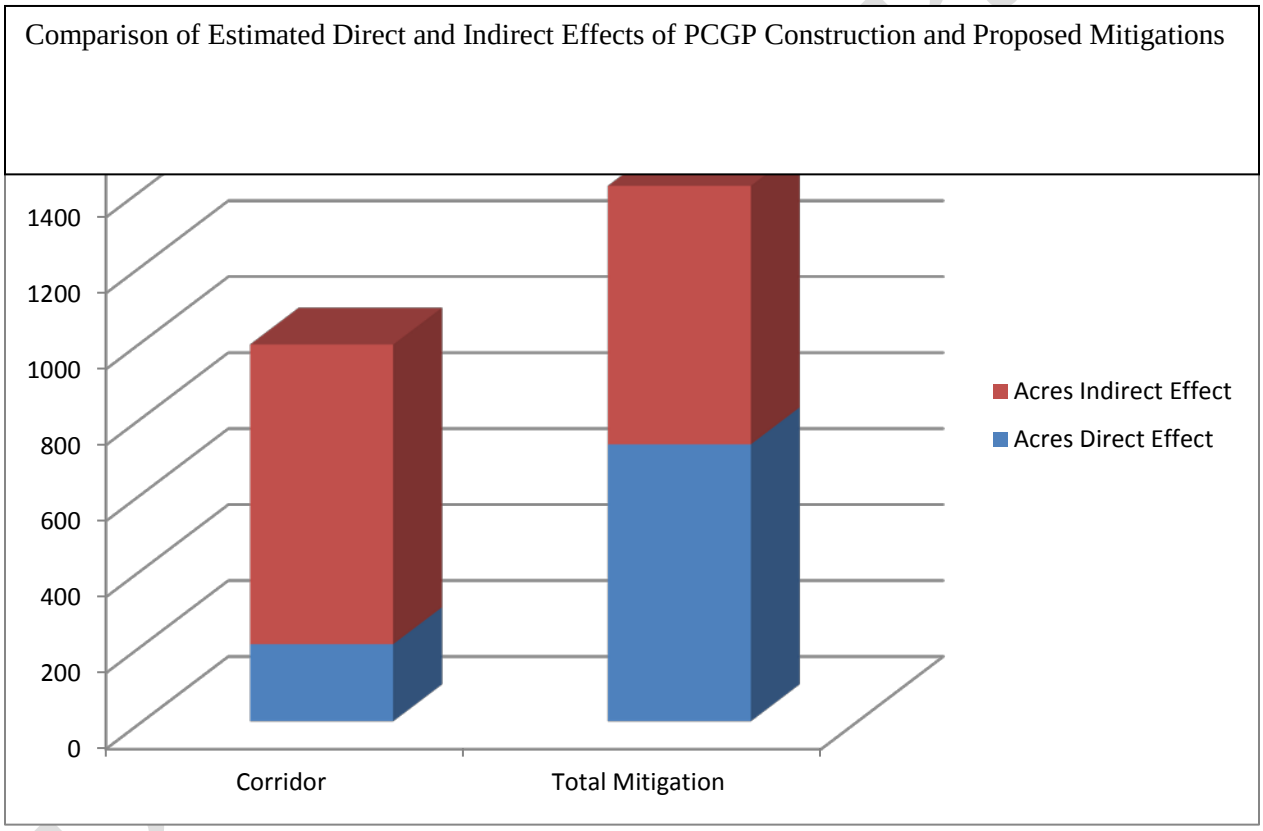
Unit Name	Prescription Level	Potential Acres	Existing 11-20" diameter logs/ac	Target 11-20" logs/ac 40'	Existing 20"+ diameter logs/ac	Target 20+" logs/ac 40'
CWD 13	1.5	10	0.0	24.9	0	9.0
CWD 15a	1.0	340.0	8.7	16.6	5.1	6.0
CWD 15b	2.0	48	8.7	33.2	5.1	12.0
Totals		398				

Comparison of total direct and indirect effects of project and mitigations on edge effects:
Acres of direct and indirect effects of the PCGP and the acres of direct and indirect effects of various mitigations as related to edge effect are shown in Table XX below. For the purposes of this comparison, indirect effects of the corridor are modeled by age class of vegetation and an associated estimate of edge effects. There is no precise method for predicting indirect effects so assumptions used for presenting this information follow.

- Indirect effects for LSOG (67 acres in corridor) are estimated to extend 600 feet on each side of the corridor. LSOG (80 years +) trees range from 100 to 180 feet depending on age. An average of 150 feet, or 4 tree heights is used for each side of the corridor.
- Indirect effects for mid-seral vegetation (10 acres in corridor) are estimated to extend 200 feet each side of the corridor. Mid seral trees are 80-100 feet tall, so this is approximately 2 tree heights each side of the corridor.
- Estimates of indirect effects in early seral or non-forested (126 acres) areas are estimated to extend 50 feet each side of the corridor.
- Indirect effects of road decommissioning are estimated to extend 50 feet each side of the decommissioned road in all vegetation classes.
- The indirect effect of stand density management is estimated to extend 100 feet from the perimeter of the unit in all vegetation classes.
- Indirect effects of other mitigations are not considered to reduce edge in this comparison.
- Using these assumptions, combined direct and indirect effects of the project and proposed mitigations are shown in Table XX below.

Table 15: Comparison of Estimated Direct and Indirect Effects of PCGP Construction and Proposed Mitigations

Rogue River NF	Acres Direct Effect	Acres Indirect Effect	Total
Corridor	**203**	**789**	**992**
Road Decommissioning	**129**	**645**	**774**
Stand Density Mgt. and other Terrestrial Mitigations.	**600**	**36**	**636**
Total Mitigation	**729**	**681**	**1410**
Sources: FERC FEIS Table 2.1-1a, USFS Estimates of Direct and Indirect Effects. (See Appendix)			



Rogue River NF	Acres Direct Effect[1]	Acres Indirect Effect[1]	Total
Corridor	**219**	**874**	**992**
Road Decommissioning[2]	**129**	**645**	**774**
Stand Density Mgt and other terrestrial mitigations[2]	**600**	**36**	**636**
Total Mitigation Acres	**729**	**681**	**1410**

Sources:
1. **FERC FEIS Table 4.6.1.2-14**
2. **USFS Estimates of Direct and Indirect Effects. (See Appendix)**

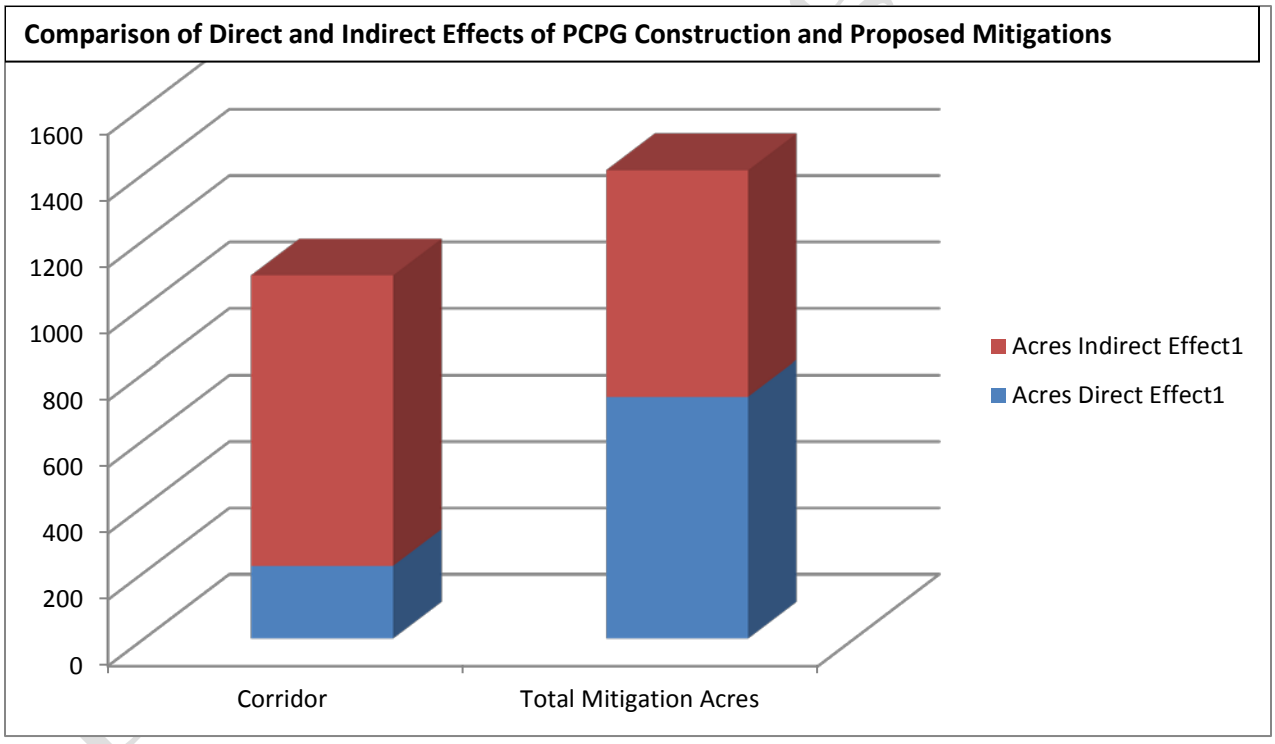
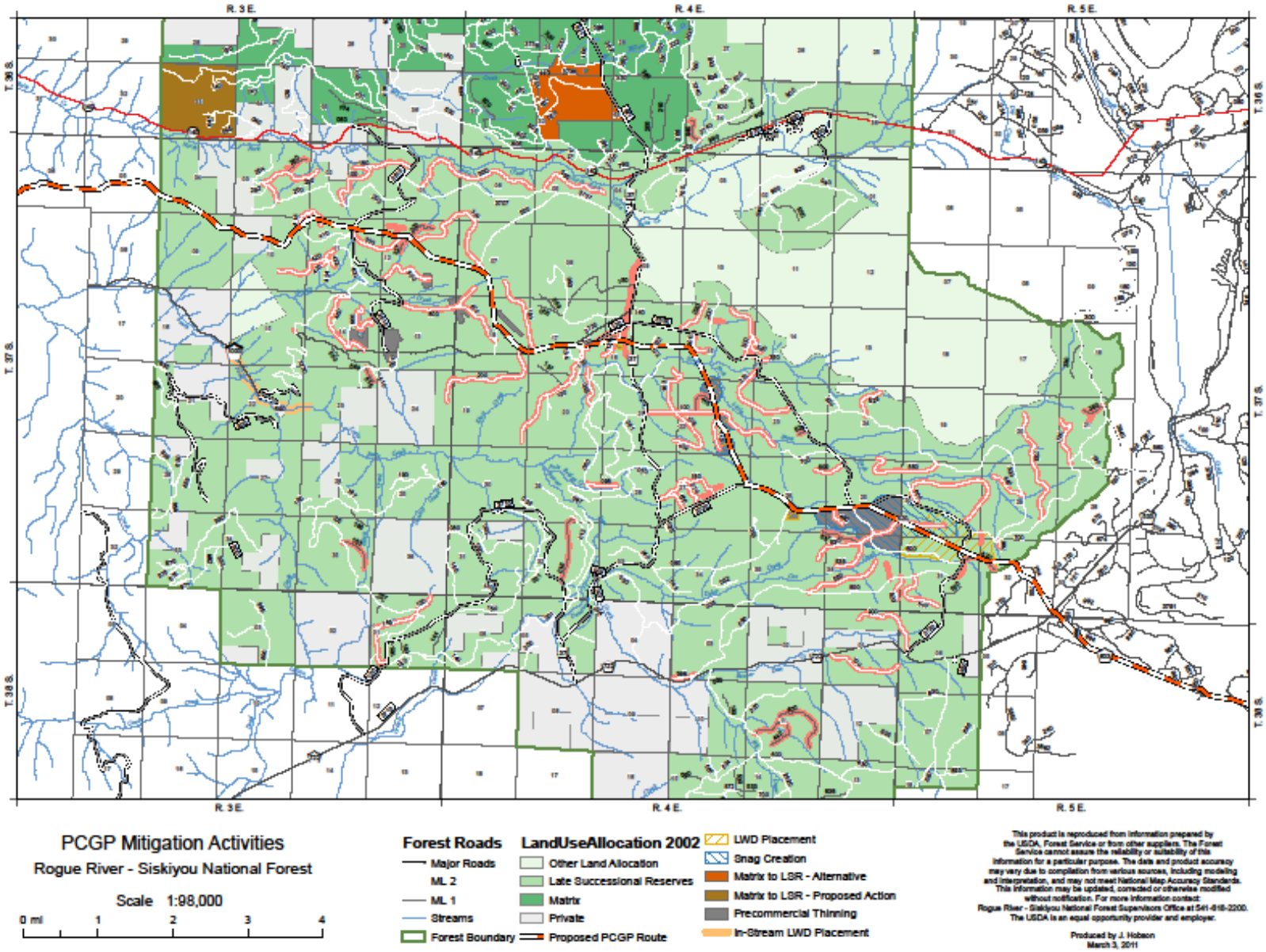


Figure 3: Proposed Mitigation Activities, Rogue River NF



Umpqua National Forest

Introduction: This report adopts and supplements the existing FERC mitigation plan for the Umpqua National Forest found in Appendix L of the FERC FEIS for the purposes of Forest Service decision making. . Land allocations crossed by the PCGP are shown below.

Table 16: Land Allocations Affected by PCGP, Umpqua National Forest

LSR	Matrix	Riparian Reserves	Total
5.89 Miles	5.33 Mile	0.55 Miles	11.77 Miles
Source: FERC FEIS Table 4.7.4.2-1, page 4.7-72			

Modifications to the Mitigation Plan Filed with FERC

Since the FERC FEIS was filed, the Forest Service has revised estimates of large woody debris (LWD) to be placed in units. LWD projects are necessarily limited by the number of pieces available from the corridor. The original proposal overestimated the pieces available and did not account for pieces needed for corridor rehabilitation resulting in more acres proposed than could be treated. Treatable acres decreased from 350 acres in LSR 223 to 100-200 acres based on more accurate estimates of available pieces and pieces needed for LWD rehabilitation within the corridor. No other changes have occurred to the Mitigation Plan filed in the FERC FEIS, however supplemental analysis information is provided in this report for the purposes of Forest Service decision making.

Large Woody Debris Placement in Plantations (100-200 acres)

The first priority in restoration with respect to LWD is to ensure that that the PCGP corridor itself meets Forest Plan standards after construction is completed. After LWD standards within the corridor have been met, any additional LWD would be available for placement in adjacent units indentified below. LWD placement in plantations is proposed to accelerate the development of late-successional and old-growth characteristics by restoring this habitat component to plantations where LWD is lacking. Log placement will occur on an estimated 100-200 acres within LSR 223. Units where LWD may be placed are shown in Figure XX below (Map needs to be clarified for reduced area). Large wood will be placed in plantations that are also receiving stand density management treatment. The large wood will be from trees cut from the pipeline corridor. No additional trees outside the corridor will be harvested to provide large woody debris, so this mitigation is necessarily limited by the amount of LWD that can be provided from the corridor. LWD used in this mitigation will be staged at appropriate locations and placed with a helicopter. Sites selected for down woody material placement will be within ½ mile of the pipeline right-of-way. As with the other off-site mitigations, placement of the mitigation activities close to the pipeline corridor can benefit species that are impacted by the vegetation changes within the corridor and will make these mitigations more effective. Sites will be in early and mid seral stands that are currently deficient in downed wood (as defined by DecAID, Southwest Oregon Mixed Conifer-Hardwood Forest, Larger Trees). The large wood placement piece count / acre is expected to vary to account for some of the range

in variability found across the landscape. The DecAid model outputs recommend managing for approximately 7% cover. Down wood levels for LSRs will be managed for piece sizes between 8 to 60 inches in diameter in all diameter classes to provide habitat for all species. Larger logs maintain moisture longer and are less likely to be fully consumed by fire.

Supplemental Mitigation Analysis

The remainder of this report supplements the FERC FEIS mitigation analysis for the purposes of Forest Service Decision making.

Reallocation of Matrix Lands to LSR

The primary management objective of the Late Successional Reserve land allocation is to protect and enhance conditions of late-successional and old-growth forest ecosystems which serve as habitat for late-successional and old-growth related species including the northern spotted owl (NWFP ROD p. C-9). Late Successional Reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem (NWFP ROD p. C-11). Mitigation activities were developed to meet the Standards and Guidelines for Multiple-Use Activities (Developments) (ROD p. C-17) which states "New development proposals that address public needs or provide significant public benefits, such as powerlines, pipelines, reservoirs, recreation sites, or other public works projects … may be approved when adverse effects can be minimized and mitigated.

The primary mitigation for the effects of the PCGP corridor on the Late Successional Reserve land allocation is to replace those acres of LSR in the corridor with additional acres of late-successional and old-growth habitat that are currently outside of the LSR. This is accomplished by the reallocation of land from the matrix land allocation to the LSR land allocation.

Figure XX shows the proposed matrix to LSR reallocation on the Umpqua National Forest. Table yy and Figure ZZ show the acres by vegetation age class in the proposed matrix to LSR land allocation compared to acres impacted by the PCGP corridor.

Figure 4: Proposed Matrix to LSR Reallocation, Umpqua NF

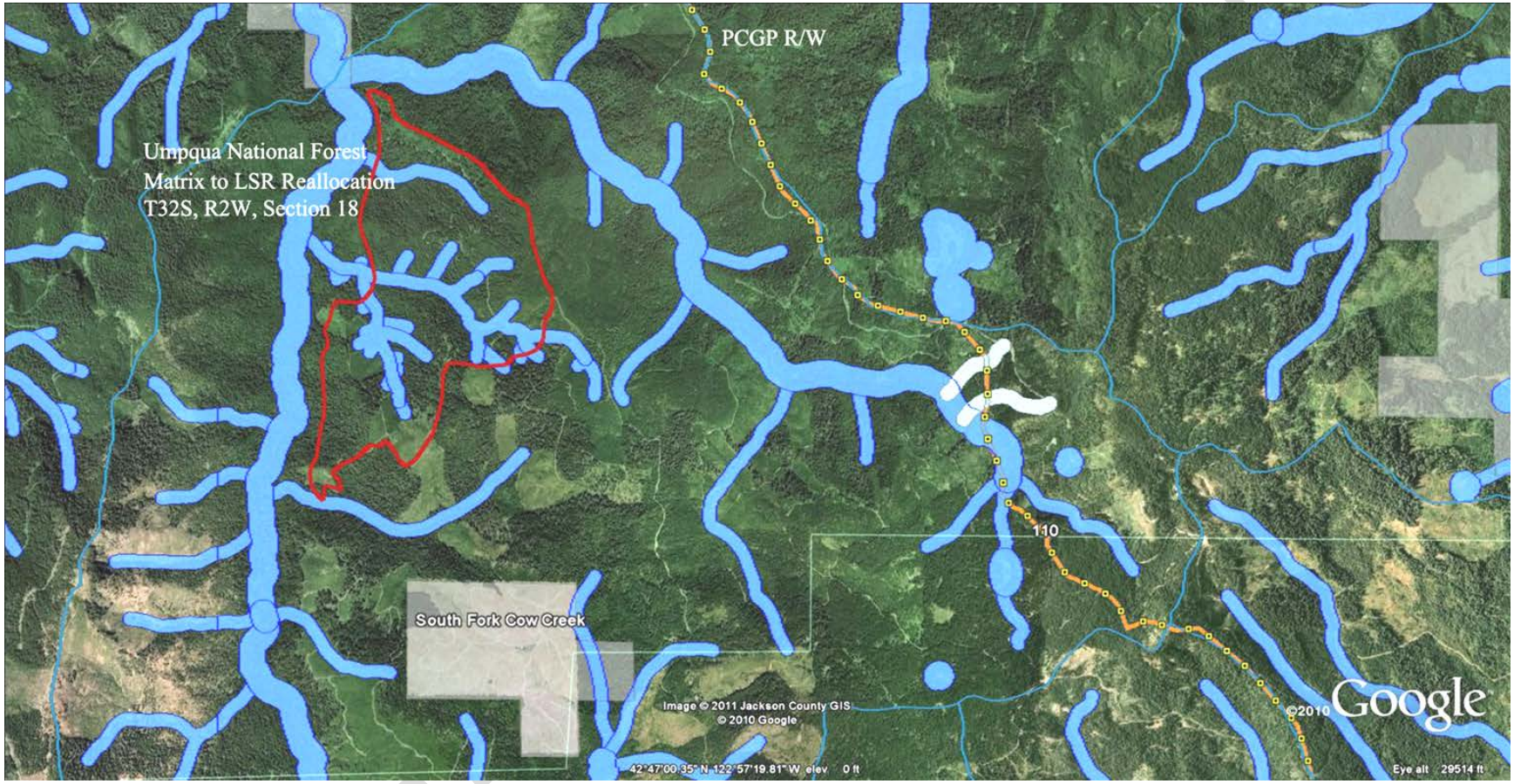


Table 17: Age Class Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 223

Umpqua NF	Total Late Successional and Old Growth (80+ yrs)	Mid-Seral (40-80 yrs)	Regenerating Plantation (5-40 yrs)	Other Habitat	Total All Age Classes
Reallocation of Matrix to LSR Proposed Action (acres)[1]	431	99	58	0	588
LSR Cleared in PCGP Corridor and TEWAs (acres)[2]	45	6	15	9	75

Sources:
1. Cox, 2010. Age Class and NSO Habitat Acre Summary, Matrix to LSR Conversion (see Appendix)
2. FERC FEIS Appendix L, Table 2.1-1a

Age Class Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 223

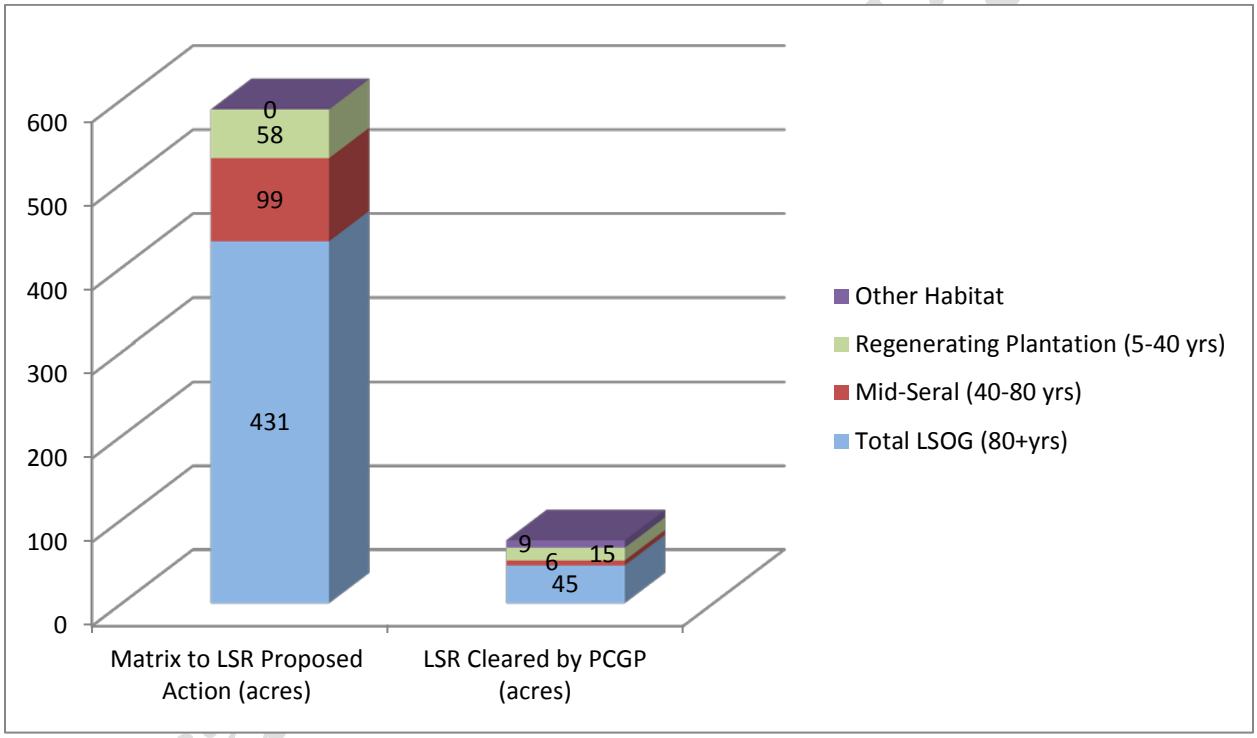


Table 18: NSO Habitat Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 223

	NSO Habitat Type			
Umpqua NF	**Suitable**	**Dispersal Only**	**Non-Suitable/ Capable but not currently suitable[3]**	**Total Acres**
Proposed Action (Acres) [1]	**431**	**99**	**58**	**588**
Habitat Cleared in PCGP Corridor and TEWAs (Acres) [2]	**47**	**17**	**10**	**74**

Sources:

1. Cox, 2010. Age Class and NSO Habitat Acre Summary, Matrix to LSR Conversion
2. FERC Biological Assessment, Table 4.3.5.3-14, page 4-204.
3. In this comparison, the Forest Service lumped capable but not currently suitable and non-suitable habitat for simplicity of comparison with matrix to LSR reallocation. See Cox, 2010, in the appendix for a breakdown of acres.

NSO Habitat Comparison: Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 223

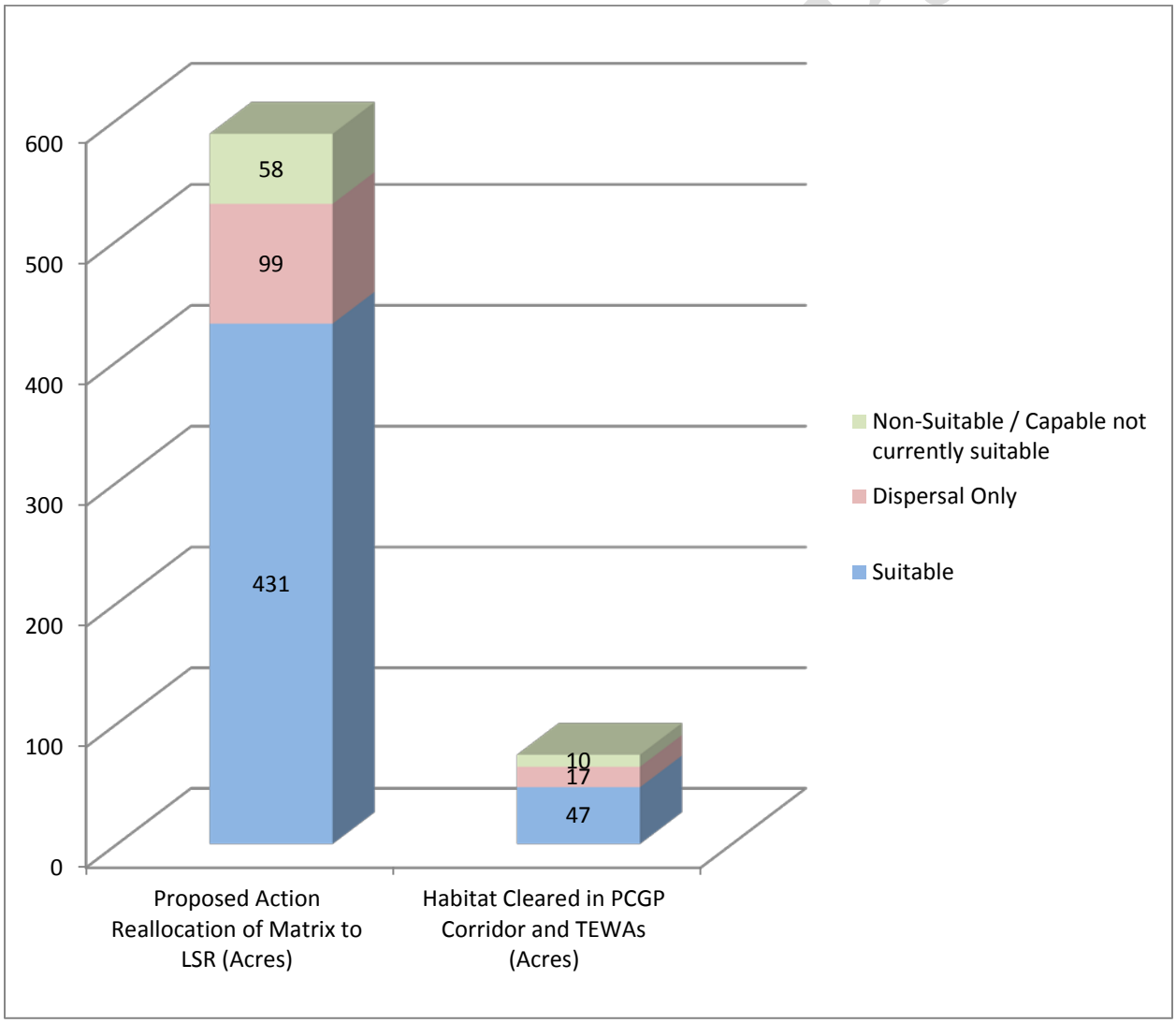


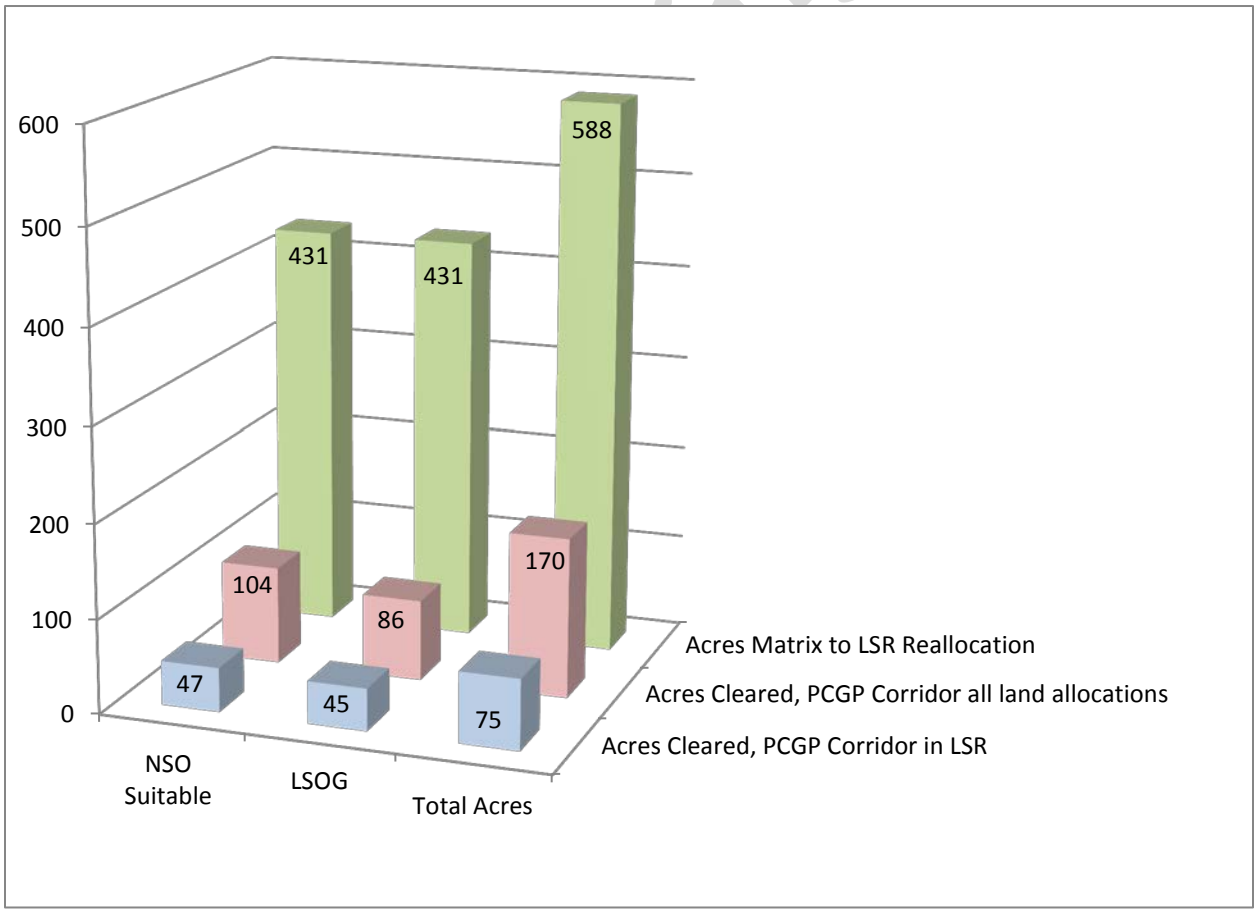
Table 19: Summary, NSO Suitable Habitat and LSOG: Comparison of Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 223

Umpqua NF	NSO Suitable Acres	LSOG Acres (80 years +)	Total Acres
Acres Cleared, PCGP Corridor in LSR	47[2]	45[1]	75[1]
Acres Cleared, PCGP Corridor and TEWAs, all land allocations	104[4]	86[4]	170[5]
Acres Matrix to LSR Reallocation, Proposed Action[3]	431 (Ratio acres reallocated to LSR NSO Suitable acres cleared: 9.2:1)	431 (Ratio acres reallocated to LSR LSOG acres cleared, 9.6:1)	588 Ratio acres reallocated to total LSR acres cleared: 7.84:1)

Sources:

1. FERC FEIS Table 2.1-1A, Appendix L,
2. FERC Biological Assessment, Table 4.3.5.3-14, page 4-208. LSR 227, West Cascades Physiographic Provinces
3. Cox, 2010. Age Class and NSO Habitat Acre Summary, Matrix to LSR Conversion (See Appendix)
4. FERC Biological Assessment, CMP Table 3.1-1a, page CMP-39
5. FERC FEIS, Table 4.4.4.4-2, page 4.4, Construction R/W and TEWAs

Summary, NSO Suitable Habitat and LSOG: Comparison of Matrix to LSR Reallocation vs. Acres Cleared by the PCGP in LSR 223



Offsite Mitigations

Direct and indirect effects of the PCGP corridor are described in the FERC FEIS and BA. Estimated acres affected by direct and indirect effects are shown in Table XX below. For the purposes of this discussion, indirect effects of the corridor are modeled by age class of vegetation and an associated estimate of edge effects. Indirect effects for LSOG (67 acres) are estimated to extend 600 feet on each side of the corridor. Indirect effects for mid-seral vegetation (10 acres) are estimated to extend 200 feet each side of the corridor. In order to offset the direct and indirect effects associated with the corridor on matrix, LSR and Riparian Reserve land allocations, offsite mitigations have also been developed by the Forest Service. These mitigations accomplish address by the direct and indirect effects of the PCGP corridor by:

- Accelerating development of larger trees by precommercial thinning young stands.
- Replacing constituent elements of habitat by placing LWD in units and creating snags.
- Reducing the risk of stand-replacing fire by stand density management, commercial thinning and fuels reduction treatments.
- Reducing habitat fragmentation by decommissioning roads and accelerating the development of interior stand conditions by stand density management
- Reducing the effects of roads on aquatic habitats by stormproofing selected roads
- Providing fish passage where passage is currently blocked by culverts.

The additional off-site mitigations will also increase the effectiveness of the late-successional old-growth habitat added to LSR 223 by improving the quantity, quality and distribution of high-quality late successional habitat as discussed in this report. The off-site mitigations associated with LSR are consistent with the Late Successional Reserve Assessment for LSR 223 and have been presented to the Late Successional Reserve Working Group that provides oversight for vegetation management in LSRs.
Road Decommissioning and Stormproofing

Road decommissioning (7.6 miles) will assist in mitigating the detrimental soil conditions from displacement and compaction that may be present on the pipeline right-of-way after the completion of pipeline construction by restoring soil conditions within off-site decommissioned roadbeds. This will increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from surface erosion within the watershed. Roads proposed for decommissioning are do not significantly reduce road density because they are located in different watersheds.

Riparian Restoration. 10.7 miles of road decommissioning will occur in Riparian Reserves. This will support riparian restoration in the South Umpqua Key Watershed by reducing compaction and by revegetating approximately 25.9 acres of decommissioned roadbeds within Riparian Reserves. Additionally there will be five-stream simulation culvert replacing existing barrel shaped culverts, posing aquatic barriers, thus enhancing aquatic connectivity for approximately 11.3 miles within the South Umpqua River system

Stand Density Management: Stand density management is proposed in early and mid seral Douglas-fir or ponderosa pine plantations that were planted to maximize timber volume and quality. The purpose of the mitigation is to increase growth, health, and vigor of the leave trees remaining in the stands; restore stand density, species diversity, and structural diversity to those considered characteristic under a natural disturbance regime by enhancing and accelerating those physical and biological services for associated

flora and fauna. Additionally, provide biomass for local energy, if marketable; and meet Forest Plan objectives for both the Matrix and Late-Successional Reserve 223 land allocations.
Table XX below displays the acres of density management activities occurring in each land allocation

Table 20: Integrated Stand Density Prescriptions by Land Allocation, Umpqua NF

Treatment Type	LSR 223 Acres	Matrix Acres	Riparian Reserve Acres
PCT	**377**	**40**	**42**
Off-Site Pine Restoration	**398**		**15**
Commercial Thinning	**138**	**406**	**35**
Total	**913**	**446**	**92**
(Source: USFS GIS, Hobson 2010)			

Fuel Break (LSR 223 2,284.6 acres Matrix 1,873 acres)
The purpose of the mitigation is to increase growth, health, and vigor of the leave trees remaining in the stands; restore stand density, species diversity, and structural diversity to those considered characteristic under a natural disturbance regime and to control the spread and intensity of wildfire within forested stands prone to fire activity (USDA 2003 Umpqua). Fuels treatments are decided on a case-by-case basis and rely on fuel loading information as well as proximity to roads and other factors. Slash treatments may be as simple as lop and scatter to get the fuels in contact with the ground for more rapid decomposition, or they may involve piling, burning or removal of fuel from the site for biomass energy.
These mitigations actions will improve the quantity, quality and distribution of late-successional habitat within LSR 223 (2,284 acres) and Matrix (1,873 acres) land allocations by ??????.

Upland Terrestrial (1,200 acres)

Snag Creation (175 acres LSR 223 and 175 acres Matrix)

Snag creation is proposed as a mitigation to replace snags lost in the pipeline right-of-way for habitat for cavity-nesting birds and denning sites for mammals (bats, bears, fishers, etc.). Snags will be lost from the pipeline corridor to facilitate pipeline construction, mitigate safety hazards for construction workers and from the removal of live trees that would have contributed to future snag habitat.

Approximately 6,300 snags (4,200 within LSR223 and 2,100 within Matrix) will be created by blasting tops from live trees (preferably trees with existing decay that makes them more suitable for cavity-nesting birds and/or as denning sites) or by inoculating living trees with heart rot decay fungi. Sites selected for snag creation will be within ½ mile of the pipeline right-of-way to develop snag habitat within (or near) the home ranges of cavity excavators being displaced by the pipeline corridor. Sites will be in mid and late seral stands.
The current direction is to manage coarse wood levels on a landscape perspective, use land allocation as a consideration on where levels of coarse may occur overtime. DecAID (a tool for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon) is a summary of the best available data on dead wood in Pacific Northwest ecosystems.

http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf It too, provides guidance for managing levels of coarse woody debris. To use DecAID, planning areas should be sufficiently large to encompass the range of variation in wildlife habitat types and structural conditions and as a rule-of-thumb; suggest that planning areas be at least 20 square miles in size (12,800 acres). Generally, 6th-field watershed (Cow Creek watershed) is appropriate scale to use for DecAID. A reasonable objective is to manage for a range of conditions within the area, balancing areas with high densities of dead wood with moderate and low-density areas (Marcot et al. 2005). The reference conditions, as described in the Cow Creek Watershed analysis, estimated the watershed structural condition. As indicated in the Cow Creek WA there are two seral stage that fall below historical structural conditions: establishment and late seral. Both these seral stages have the highest levels of large coarse wood while the other seral stage represents the lower levels of coarse wood. With approximately 70% of the watershed experiencing intensive timber harvest management retaining on an average less than 2 sang per acre, (Table 16, Cow Creek WA) this indicate a need for high levels of snags within the watershed.

Wildlife and inventory data summarized in the DecAID Advisor can be applied to management and planning decisions at a range of spatial scales and geographic extents. The calculated tolerance levels (80%, 50%, 30 %) for wildlife data can be applied to stand-level management. However, it is not advise that a particular tolerance level be applied to all stands across a landscape. Rather, decisions about how to distribute different levels of dead wood across a landscape can be guided by the distribution information from unharvested plots. Without gathering additional data on current coarse wood levels and assuming that private lands will be manage at the lowest tolerance level of coarse wood. for wildlife and forest species. The current density of snag levels within the Cow Creek WA range from 0 to 7 snags per acre (Table 16, Cow Creek WA). Looking at the percent (70%) of the area that have low or no snag density it seem that we should be managing at higher density where possible at this time. Considering the land allocations the location of the size of the project we should be managing for high and moderate sang densities on this project. The project should manage at the 80% tolerance level in LSR and 50% tolerance level for Matrix land allocation. However, most of the proposed pipeline is located along ridge tops that is prone to fire disturbance within moderate severity fire regime (USDA 2003 Umpqua). Considering fuels it is appropriate to manage at lower density of small snags and down wood in both tolerance levels.

Within LSR manage snags densities at 16/acre > 10.0 in, of which 8/acre are > 20 in dbh.

In Matrix manage snag densities at 8/acre > 10.0 in, of which 4/acre are > 20 in dbh.

Within the Matrix allocation, manage for down wood at about 3.6% cover

Weeds 6.73 miles
Soils disturbed during pipeline construction and proposed mitigation activities have the potential to disperse and generate potential seedbeds for noxious weeds. The proposed treatment along 6.73 miles roads with LSR 223 will assist in mitigating potential adverse habitat impacts.

Meadow Restoration 123 acres

Mitigate impacts to Unique habitats impacted by the project, There will be loss of forest habitat buffering the unique habitats and disruption to soil horizons within those habitats. These actions will result in adverse impact to native flora, fauna, and enhancing the opportunities for evasion of non-native plant species. These impacts cannot be fully mitigated on site, therefore restoration activities such as: burning, removal of encroaching conifers and noxious control will be applied to a 123 acre unique habitat located in both Matrix (43 acres) and LSR 223 (80 acres)

Appendix A: Data Tables

Data Synopsis

Changes in road density[5] resulting from implementation of road decommissioning mitigations

Spencer Creek Tier 1 Key Watershed, Winema National Forest
Little Butte Creek Tier 1 Key Watershed, Rogue River National Forest

Data Abstract: Data is derived from a GIS analysis by the FS using shape files from the updated mitigation plan dated 3/09/11 and FS transportation layer data. Tables 1 and 2 show changes in road density in Spencer Creek and Little Butte Creek Tier 1 Key Watersheds (KWS) that would result from implementation of the proposed road decommissioning that is part of the mitigation plan for the PCGP. Road densities are calculated for NFS roads on NFS lands. Spencer Cr. KWS all roads density is for all land allocations in the Spencer Cr. watershed. Little Butte Cr. KWS all roads density is shown for both the LSR portion of Little Butte Cr. KWS and as a summary for all land allocations in Little Butte Creek. Distances of ¼, ½ and 1 mile from the PCGP corridor are included to show relative comparisons of the effect of proposed road decommissioning in proximity to the effect of the PCGP corridor.

Comparison of effects of road decommissioning[6] and impacts of the PCGP corridor

Spencer Creek Tier 1 Key Watershed
Little Butte Creek Tier 1 Key Watershed

Data Abstract: Data is derived from the FERC FEIS and Biological Assessment and Forest Service GIS data in shape files dated 3/09/11 as noted in the tables. Data comparisons are as follows:

- **Miles in Watershed** compares the miles of the PCGP corridor in the watershed to the miles of roads that are proposed to be decommissioned. This information is important because decommissioning roads help offset the unavoidable watershed effects of the PCGP corridor. This provides a relative comparison of impact of the project to benefits of proposed road decommissioning.
- **Miles in Riparian Reserves** compares the miles of the PCGP corridor that occur in Riparian Reserves to miles of roads proposed to be decommissioned in Riparian Reserves. This information is important because it allows a comparison of riparian vegetation and habitat that will be impacted by the PCGP to the riparian vegetation and habitat where restoration can occur as part of road decommissioning.

[5] NFS lands only
[6] NFS lands only

- **Acres in Degraded Soil Condition** compares estimated acres that will be displaced or compacted within the PCGP corridor to the estimated acres of existing roads where degraded soil conditions will be restored by decommissioning existing roads. This information is important because degraded soil conditions can adversely affect watershed functions such as sediment routing and infiltration. This provides a relative comparison of the estimated adversely impacted soil conditions to the potential restoration accomplished in proposed road decommissioning.
- **Stream Crossings** compares the number of stream crossed by the PCGP to the number of stream crossings in decommissioned roads. This is important because most watershed – road interactions occur at or near stream crossings. This provides a relative comparison of the potential watershed effects associated with stream crossings in the PCPG corridor and the potential watershed benefits associated with decommissioning roads where they intersect streams.

Spencer Creek and Little Butte Creek are both Tier 1 Key Watersheds in the NWFP.

Reallocation of matrix lands to LSR

Rogue River NF 227

- **Comparison of age classes of PCGP corridor to proposed matrix to LSR Reallocation**
- **Comparison of NSO habitat cleared in PCGP corridor to proposed matrix to LSR Reallocation**
- **Summary comparison PCGP corridor acres cleared to LSOG and NSO Suitable habitat**

Umpqua NF LSR 223

- **Comparison of age classes of PCGP corridor to proposed matrix to LSR Reallocation**
- **Comparison of NSO habitat cleared in PCGP corridor to proposed matrix to LSR Reallocation**
- **Summary comparison PCGP corridor acres cleared to LSOG and NSO Suitable habitat**

Data Abstract: Information concerning age classes and NSO habitat types in the PCGP corridor was derived from the FERC FEIS or Biological Assessment as noted. Information concerning age class and NSO habitat on matrix lands proposed for reallocation from matrix to LSR was derived from field verification of aerial photo and GIS analysis by the Forest Service. PCGP acres represent the area in the right of way corridor and the temporary extra work areas cleared as part of construction. On the Rogue River NF, an alternative matrix to LSR comparison was developed in response to public scoping comments so tables show both the proposed action and an alternative.

Presented in Order of Appearance

Cox, 2010
FERC FEIS, Table 2.1-1a
FERC FEIS Table 4.3.5.3-14
FS GIS Analysis of Mitigation Acres

Matrix to LSR Habitat (Source: USFS GIS, Cox 2010)

RRS- Age Class - Sec 32 - New Alternative (512 Acres total)

Age Class	Acres
Old Growth (175 + years)	320
Late successional (80 to 175 years)	13
Shelter Wood Regenerating (5 to 40 years)	157
Regenerating (5 to 40 years)	22

Northern Spotted Owl Habitat - Sec 32 - New alternative

Habitat Type	Acres
Suitable	320
Dispersal	13
Non-suitable	179
Capable Northern Spotted Owl Habitat	512

RRS- Age Class - Sec 33 - Proposed Action (593 Acres)

Age Class	Acres
Old Growth (175 + years)	21
Late successional (80 to 175 years)	249
Shelter Wood Regenerating (5 to 40 years)	45
Regenerating (5 to 40 years) Plantation	8
Regenerating (5 to 40 years) Forested burned area	155
Open meadow habitat	115

RRNF Northern Spotted Owl Habitat - Sec 33 - Proposed Action

Habitat Type	Acres
Suitable	270
Dispersal	0
Non-suitable	323
Capable Northern Spotted Owl Habitat	478

Umpqua- Age Class – Proposed Action (588 Acres)

Age Class	Acres
Old Growth (175 + years)	134
Late successional (80 to 175 years)	297
Med seral (40 to 80 years)	99
Regenerating (5 to 40 years)	58

Northern Spotted Owl Habitat – Proposed Action

Habitat Type	Acres
Suitable	431
Dispersal	99
Non-suitable	58
Capable Northern Spotted Owl Habitat	588

Table 2.1-1a.
Total Terrestrial Habitat (acres) Affected/Removed[1] by Construction of the Proposed Action within Late Successional Reserves

LSR ID (Total Acres)[2]	Federal Jurisdiction	Forested Habitat [3]					Other Habitat [3]				Total LSR Impact (acres)
		Late Successional – Old Growth Forest	Mid-Seral Forest	Regenerating Forest	Clearcut Forest	Total	Forested Wetland	Unaltered Habitat	Altered Habitat	Total	
RO 261 (70,611 acres)	Coos Bay BLM	0.89	4.98	9.88	0	15.75	0	0	1.42	1.42	**17.17**
	Roseburg BLM	4.59	4.36	8.44	0.06	17.45	0	0	1.64	1.64	**19.09**
	RO 261 Total	**5.48**	**9.34**	**18.32**	**0.06**	**33.20**	**0**	**0**	**3.06**	**3.06**	**36.26**
RO 223 (66,173 acres)	Roseburg BLM	28.96	0.38	11.49	0	40.83	0.29	0.08	2.13	2.50	**43.33**
	Umpqua N.F.	44.89	5.74	15.07	0	65.70	0	0	8.94	8.94	**74.64**
	RO 223 Total	**73.85**	**6.12**	**26.56**	**0**	**106.53**	**0.29**	**0.08**	**11.07**	**11.44**	**117.97**
RO 227 (101,600 acres)	Rogue River – Siskiyou N.F.	67.40	10.36	79.74	9.87	167.37	0	14.27	21.52	35.79	**203.16**
	RO 227 Total	**67.4**	**10.36**	**79.74**	**9.87**	**167.37**	**0**	**14.27**	**21.52**	**35.79**	**203.16**
All LSR Units (238,384 acres)	Coos Bay BLM	0.89	4.98	9.88	0	15.75	0	0	1.42	1.42	**17.17**
	Roseburg BLM	33.55	4.74	19.93	0.06	58.28	0.29	0.08	3.77	4.14	**62.42**
	Umpqua N.F.	44.89	5.74	15.07	0	65.70	0	0	8.94	8.94	**74.64**
	Rogue River – Siskiyou N.F	67.40	10.36	79.74	9.87	167.37	0	14.27	21.52	35.79	**203.16**
	Overall Total	**146.73**	**25.82**	**124.62**	**9.93**	**307.10**	**0.29**	**14.35**	**35.65**	**50.29**	**357.39**

[1] Project components considered in calculation of habitat "Removed": PCGP construction right-of-way, temporary extra work areas, aboveground facilities, and permanent and temporary access roads (PAR, TAR).
[2] Overall Total Acres within each LSR were obtained from the following Late Successional Reserve Assessments: BLM and Forest Service, 1998 (RO 261); BLM and Forest Service, 1999 (RO 223); and FWS et al., 1998 (RO 227).
[3] Habitat Types within Late Successional Reserves generally categorized as: Late Successional (Mature) or Old Growth Forest (coniferous, deciduous, mixed ≥80 years old); Mid-Seral Forests (coniferous, deciduous, mixed ≥40 but ≤80 years old); Regenerating Forest (coniferous, deciduous, mixed ≥5 but ≤40 years old); Clearcut Forests; Wetland Forested, Unaltered Nonforested Habitat (grasslands, sagebrush, shrublands), and Altered Habitats (urban, industrial, residential, roads, utility corridors, quarries).

TABLE 4.3.5.3-14

Summary of Suitable, Dispersal, Capable, and Non-Suitable Habitat by Physiographic Province Impacted within NWFP Late-Successional Reserves (LSR) (Table Q5 in Appendix Q)

Land Owner	NWFP LSR (overlap with CHU)	Suitable Habitat a/		Dispersal Habitat b/		*Dispersal Only Habitat c/*		Capable Habitat d/		Non-Suitable Habitat e/		Total Acres h/	
		Removed f/	Modified g/	Removed f/	Modified g/	*Removed f/*	*Modified g/*	Removed f/	Modified g/	Removed f/	Modified g/	Removed f/	Modified g/
Coast Range Physiographic Province													
Coos Bay BLM	RO 261	0.89	0.00	12.42	0.90	*13.31*	*0.90*	2.44	0.17	1.42	0.02	17.17	1.08
Roseburg BLM	RO 261	4.08	8.35	7.68	6.77	*11.76*	*15.12*	2.82	1.85	1.86	0.53	16.44	17.50
Klamath Mountains Physiographic Province													
Roseburg BLM	RO 261	0.54	0.78	4.85	0.14	*5.39*	*17.05*	2.17	0.03	0.59	0.00	8.15	0.95
Roseburg BLM	RO 223	29.47	12.99	11.09	3.14	*40.56*	*16.13*	1.11	0.29	2.31	0.09	43.97	16.51
Umpqua N.F.	RO 223 (OR-14)	46.82	18.28	17.65	0.84	*64.47*	*19.12*	0.70	0.39	9.02	0.00	74.19	19.51
Umpqua N.F.	RO 223	0.58	2.33	0.00	0.00	*0.58*	*2.33*	0.0	0.00	0.00	0.00	0.58	2.33
West Cascades Physiographic Province													
Rogue River – Siskiyou N.F.	RO 227 (OR-17)	68.29	35.04	62.63	24.99	*130.92*	*60.03*	36.75	9.06	35.99	3.20	203.66	72.29
East Cascades Physiographic Province													
Rogue River – Siskiyou N.F.	RO 227 (OR-17)	2.18	0.90	0.98	0.28	*3.16*	*1.18*	0.00	0.00	0.00	0.00	3.16	1.18
Overall Total													
Overall Total		**152.85**	**78.67**	**117.30**	**37.06**	***270.15***	***131.86***	**45.99**	**11.79**	**51.19**	**3.84**	**367.32**	**131.35**

a/ Suitable Habitat: Forest stands used by NSO for nesting, roosting, and foraging (conifer dominated, 80+ years, multi-storied, sufficient snags and LWD, canopy closure > 60%). This was determined using the BioMapper model described in Section 4.2.5.2 (Habitat subsection) that included mid-seral, late successional, and old-growth coniferous forest PLUS coniferous forest habitat determined to be 80 years within the project area but not included in the model (all late successional and old-growth within the range of the spotted owl).

b/ Dispersal Only Habitat (only includes dispersal habitat not located in suitable habitat): support owl movement across landscape but lack structural characteristics to support nesting (conifer and mixed mature conifer-hardwood, canopy cover ≥ 40%, average dbh ≥ 11 inches). This was determined using the GNN model described in Section 4.2.5.2, Habitat subsection where all forested habitat (coniferous, mixed coniferous/deciduous, and deciduous) occurs within the project area but did not include recent clearcut areas.

c/ Total Dispersal Habitat (includes dispersal habitat that coincides with suitable habitat): support owl movement across landscape but lack structural characteristics to support nesting (conifer and mixed mature conifer-hardwood, canopy cover ≥ 40%, average dbh ≥ 11 inches). The acres within this column are not included in the Total Acres since they are included in Suitable and Dispersal Only.

d/ Capable Habitat: not currently spotted owl habitat (see # 3 and #4) but have the potential to become habitat in the future and includes recent clearcuts, as well as other regenerating and mid-seral forested habitat (plus all seral stages of deciduous forest) not included within the suitable habitat or dispersal habitat models.

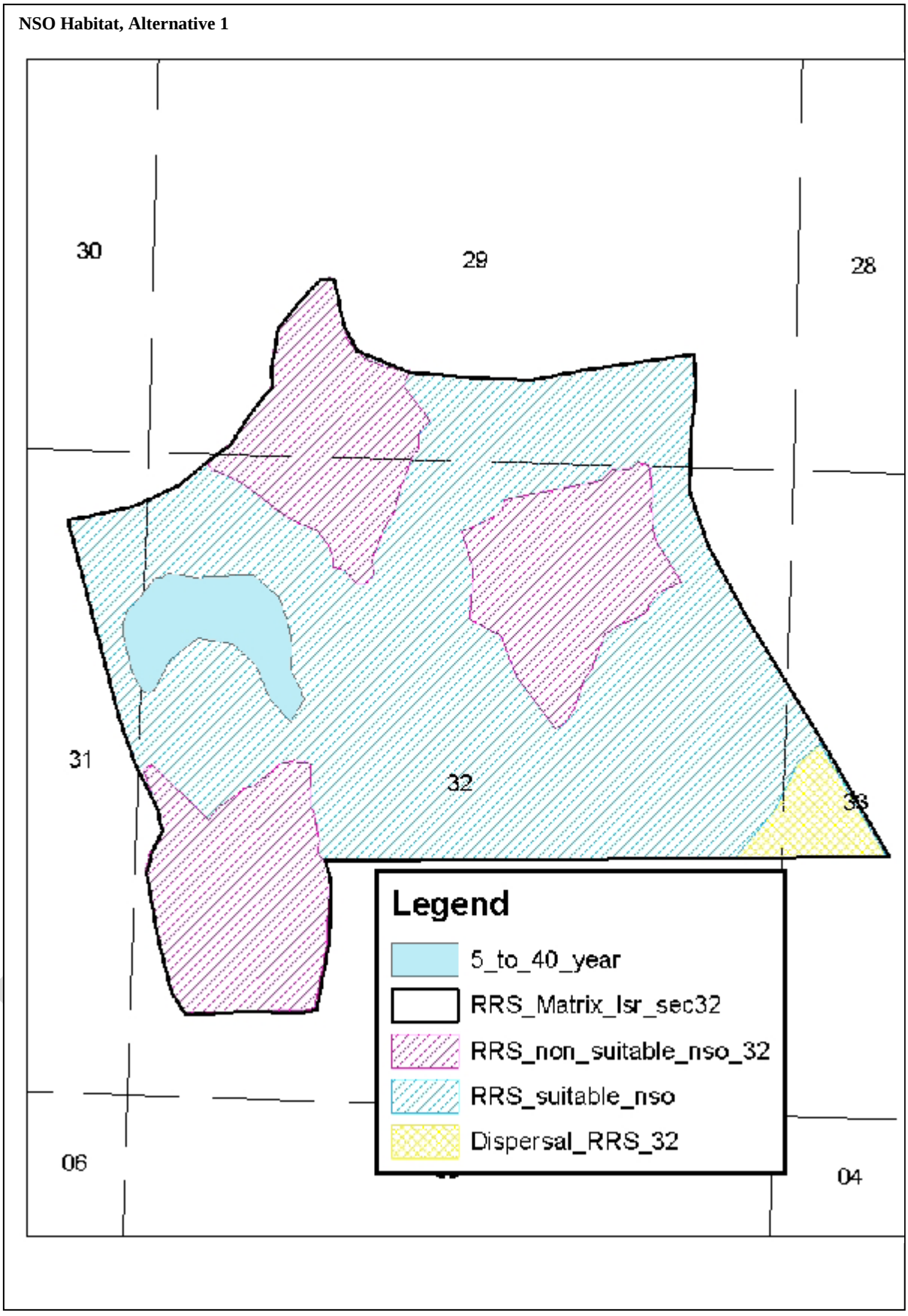
e/ Noncapable Habitat: areas such as lakes, rivers, rock outcroppings, roads

f/ Project components considered in calculation of habitat "Removed": Pacific Connector pipeline construction right-of-way, temporary extra work areas, aboveground facilities, permanent and temporary access roads (PAR, TAR), pipe storage yards.

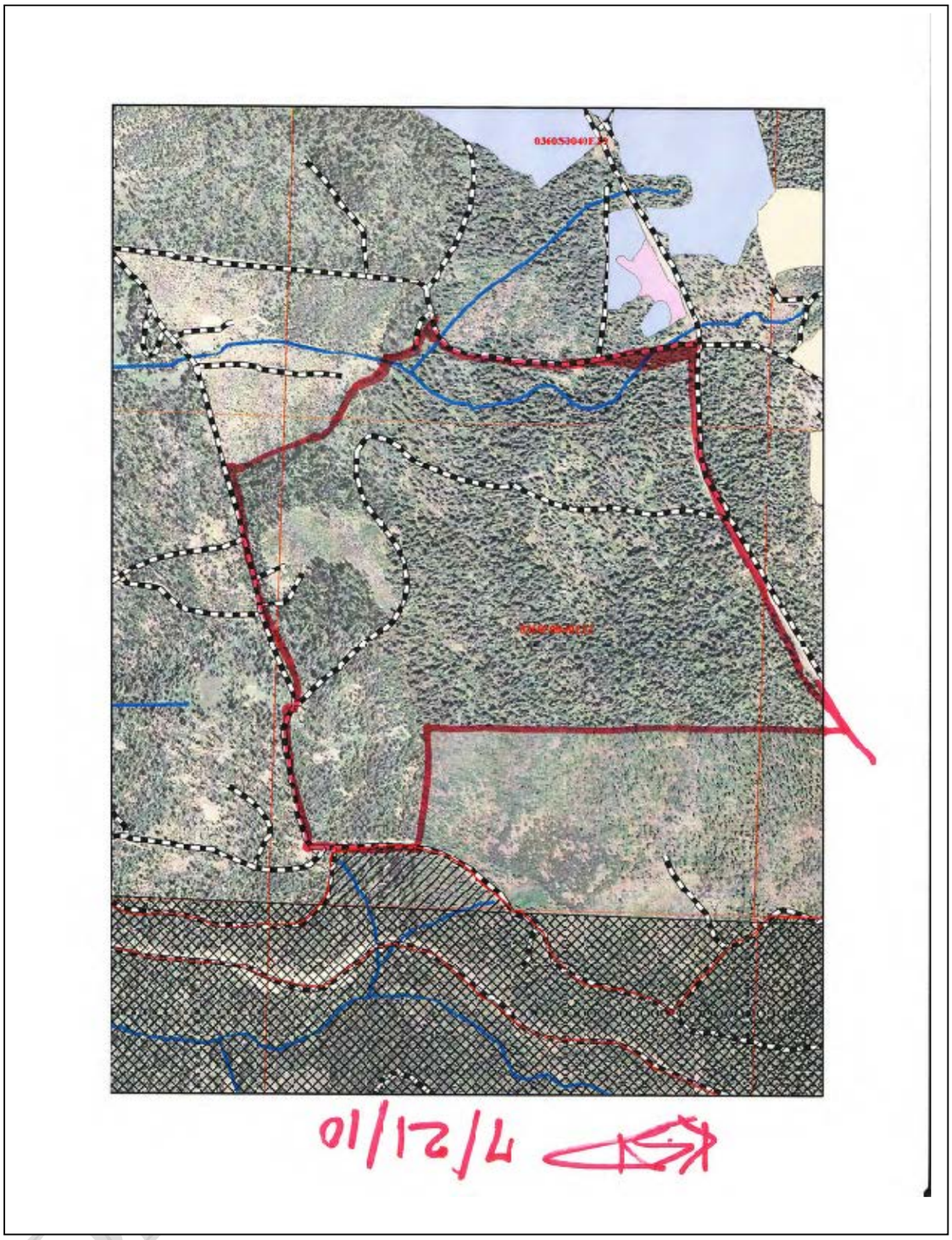
g/ Project components considered in calculation of habitat "Modified": Pacific Connector pipeline uncleared storage areas (UCSAs) described in Section 3.3.3.2 of the Project Description and will not be cleared of trees during construction. These areas will be used to store forest slash, stumps and dead and downed log materials that will be removed and scattered across the right-of-way after construction during restoration and are considered as temporary insignificant habitat modifications.

h/ Total Acres includes only the removed and modified columns within Suitable NRF, Dispersal Only, Capable, and Non-Capable Habitat.

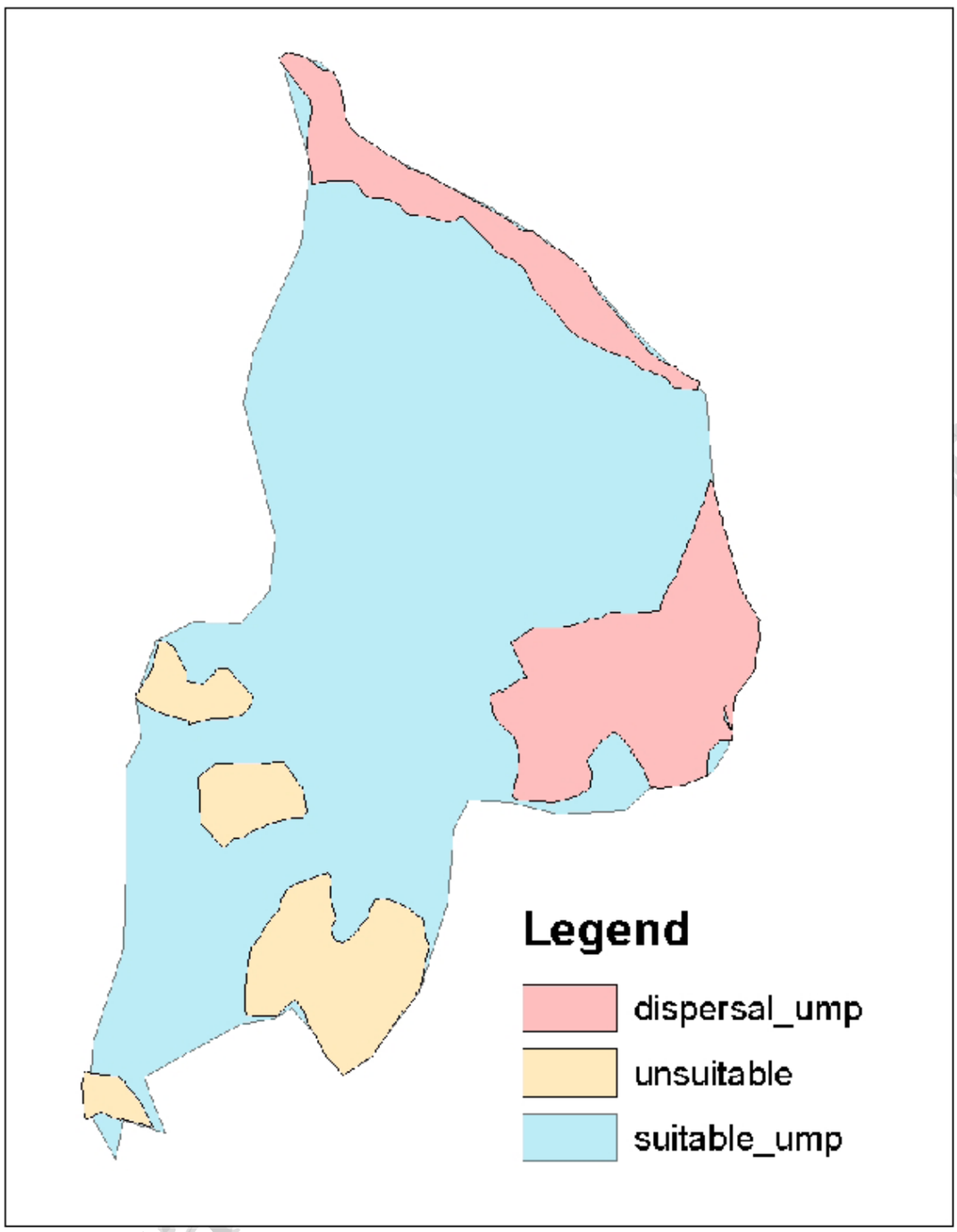
NSO Habitat, Alternative 1



Rogue River Alternative 1 Boundary



Umpqua National Forest Proposed Action, NSO Habitat



USFS GIS Analysis, Road Decommissioning

RRS NF – Little Butte Creek Road Decom analysis 030911 final				
Riparian Reserves				
Watershed	Miles	GIS Acres		
Little Butte Creek	6.73	14.3155		
Stream Crossings	Class	Frequency		
	II	1		
	III	1		
	IV	30		
PCGP Buffers	Total Acres	Total miles NFS Roads	Road Density -- all roads	Road Density -- less proposed Decommissioned roads
Rogue River NF LBC 5th field watershed 030911 Final				
1/4 mile buffer	4,335.20			
All roads		26.50	3.91	
Road_Decom_052810.xlsx (Calibrated)		9.16		
37207XX-A (0.06812)				
37207XX-B (0.088)				
Roads less decommissioned		17.34		2.56
1/2 mile buffer	8,695.90			
All roads		56.00	4.12	
Road_Decom_052810.xlsx (Calibrated)		19.24		
37207XX-A (0.1546)				
37207XX-B (0.1546)				
Roads less decommissioned		36.76		2.71
1 mile buffer	16,709.20			
All roads		109.10	4.18	
Road_Decom_052810.xlsx (Calibrated)		36.86		
37207XX-A (0.1545)				
37207XX-B (0.1545)				
Roads less decommissioned		72.24		2.77
All NFS Roads, LSR 227 in LBC	44,028.21	266.05	3.87	
Mile decommissioned LSR 227 in LBC		53.50		3.09
All NFS Roads, NFS Lands LBC	57,234.02	292.19	3.27	
Miles decommissioned LBC		53.50		2.67

Winema NF, Spencer Creek WS- Road Decom analysis 030911 Final			
Stream Crossings			
Stream Class	**Frequency**		
Intermittent	25		
Riparian Reserves			
Miles	GIS Acres		
5.276	12.7868		
Spencer Creek WS Road Density, 030911 update			
PCGP Buffers	Total Acres	Total NFSR Miles	Road Density
1/4 mile buffer	1854.20		
NFSR roads		13.53	4.67
Decom Roads		5.56	
Roads less decom		7.97	2.75
1/2 mile buffer	3448.21		
NFSR roads		23.34	4.33
Decom Roads		7.86	
Roads less decom		15.48	2.87
1 mile buffer	6317.58		
NFSR roads		38.52	3.90
Decom Roads		10.95	
Roads less decom		27.57	2.79
All NFS Lands, Spencer Cr. KWS	22284.1	91.85	2.64
Decom Roads		21.45	
Roads less Decom		70.40	2.02

Umpqua Mitigation Acres (Source: USFS GIS Data)						
Fuel Break						
HU_10_NAME	Acres	LSR	Matrix	Rip. Res.	Admin. Withdrawn	Other
Days Creek-South Umpqua River	449.02	254.17	194.81			0.00
Elk Creek	1183.04	953.91	229.14	101.74		0.00
Trail Creek	566.86		566.86	46.82		0.00
Upper Cow Creek	1922.68	1076.60	846.08	235.53		
Matrix - LSR						
HU_10_NAME	Acres					
Upper Cow Creek	585.04	2.33	580.31	130.24	2.40	
Commercial Thin						
HU_10_NAME	Acres					
Days Creek-South Umpqua River	170.95		170.94			0.00
Elk Creek	94.84	93.28	1.56	2.20		
Trail Creek	0.45		0.45			
Upper Cow Creek	277.72	47.81	229.92	32.39		
Log Placement						
HU_10_NAME	Acres					
Days Creek-South Umpqua River	4.66		4.66			
Elk Creek	289.74	263.27	26.47	17.05		
Trail Creek	13.92		13.92			
Upper Cow Creek	235.73	101.21	134.52	5.65		
Meadow Restore						
HU_10_NAME	Acres	LSR	Matrix	Rip. Res.	Admin. Withdrawn	Other
Days Creek-South Umpqua River	22.72	22.72				
Elk Creek	100.58	57.36	43.22	4.97		
LSR PCT						
HU_10_NAME	Acres					
Days Creek-South Umpqua River	53.86	53.48	0.38			
Elk Creek	363.04	323.57	37.44	42.27		2.03

Offsite Pine						
HU_10_NAME	Acres					
Days Creek-South Umpqua River	59.40	58.14				1.26
Elk Creek	338.43	338.36	0.07	15.48		
Roads						
Weeds						
HU_10_NAME	Miles					
Elk Creek	6.73	6.22	0.51			
Stormproofing						
HU_10_NAME	Miles					
Elk Creek	1.59	1.59				
Trail Creek	0.58		0.58			

Road Decommissioning						
HU_10_NAME	Miles					
Days Creek-South Umpqua River	0.45	0.45				
Dumont Creek-South Umpqua River	3.16	3.16		0.28		
Elk Creek	4.65	3.47	1.09	0.32		0.10
Evans Creek	0.02		0.02			
Trail Creek	1.75		1.75	0.11		
Upper Cow Creek	4.44	0.77	3.68	0.17		

*****Note the total mileage for the layer representing road decommissioning was adjusted - the old total mileage was 14.72 miles and the new total mileage is 14.47 miles.

USFS GIS Analysis

RRS NF – Little Butte Stream Crossings on Decommissioned Roads 030911 Final				
Riparian Reserves				
Watershed	**Miles**	**GIS Acres**		
Little Butte Creek	6.7252	14.3155		

Little Butte Creek Watershed Stream Crossing – Decommissioned Road Intersects 030911 Final	Stream Crossings
Beaver Dam Creek Subwatershed Class 4	7
Beaver Dam Creek Subwatershed Class 3	1
Middle South Fork Little Butte Creek Subwatershed Class 4	6
Upper North Fork Little Butte Creek Subwatershed Class 4	8
Upper South Fork Little Butte Creek Subwatershed Class 4	9
Upper South Fork Little Butte Creek Subwatershed Class 2	1
Total	32

RRS NF – Little Butte Creek Road Density Analysis 030911 final	Total Acres	Total miles	Road Density -- all roads	Road Density -- less proposed Decommissioned roads
Rogue River NF LBC 5th field watershed 030911 Final				
1/4 mile buffer	4335.2			
All roads		26.50	3.91	
Road_Decom_052810.xlsx (Calibrated)		9.16		
37207XX-A (0.06812)				
37207XX-B (0.088)				
Roads less decommissioned		17.34		2.56
1/2 mile buffer	8695.9			
All roads		56.00	4.12	
Road_Decom_052810.xlsx (Calibrated)		19.24		
37207XX-A (0.1546)				
37207XX-B (0.1546)				
Roads less decommissioned		36.76		2.71
1 mile buffer	16709.2			
All roads		109.10	4.18	
Road_Decom_052810.xlsx (Calibrated)		36.86		
37207XX-A (0.1545)				
37207XX-B (0.1545)				
Roads less decommissioned		72.24		2.77

Winema NF, Spencer Creek WS- Stream Crossings on Decommissioned Roads 030911 Final		
Stream Crossings		
Stream Class	**Frequency**	
Intermittent	25	
Riparian Reserves		
Miles	GIS Acres	
5.276	12.7868	

Spencer Creek WS Road Density Analysis 030911 Final			
PCGP Buffers	Total Acres	Total Miles	Road Density
1/4 mile buffer	4814.05		
All roads		30.31	4.03
Decom Roads		5.60	
Roads less decom		24.71	3.28
1/2 mile buffer	9616.36		
All roads		42.41	2.82
Decom Roads		7.90	
Roads less decom		34.51	2.30
1 mile buffer	19230.40		
All roads		62.87	2.09
Decom Roads		11.00	
Roads less decom		51.86	1.73

FRAGMENTATION ANALYSIS REPORT
PACIFIC GAS PIPELINE

Rogue-River – Siskiyou National Forest
Draft 2/24/10

BACKGROUND

The proposed Pacific Gas Pipeline crosses the Rogue River – Siskiyou National Forest through LSR 227 on the Dead Indian Plateau. This land base is currently managed as part of the High Cascades Ranger District.

The original Pipeline EIS was approved by FERC in the winter of 2009-2010, with initial construction planned for 2010. Prior to construction the Rogue River – Siskiyou National Forest needs to amend several aspects of its Forest Plan to allow this type of activity to occur within the LSR. One of the larger issues of allowing pipeline construction is loss of spotted owl habitat within a Late Successional Reserve (LSR) and the fragmentation and degradation of the remaining habitat by creating a linear opening across the LSR. One of the proposed mitigations for this habitat loss/degradation is the closing and replanting of old roads. Over a long period of time these revegetated roads will grow into forest, eliminating edge and reducing habitat degradation through edge effects.

This analysis is designed to measure changes in fragmentation (both positive and negative) from development of the pipeline, planting of the pipeline work corridor, and planting of closed roads. Therefore, the area of analysis is the entire LSR, since the roads are scattered over much of the LSR land base. Because the long term changes modeled at 60 years from treatment include stand development across the forested landscape, there is no way to separate out the impacts specific to the proposed management activities. For this reason a separate model run was done looking at only those stands adjacent to the pipeline and the proposed road closures. The analysis does not include the lands proposed for conversion from Matrix to LSR along the north edge of the LSR.

The LSR Assessment and Northwest Forest Plan do not directly address fragmentation. Fragmentation is implicit in the discussions of dispersal and spotted owl habitat quality. Fragmentation is an integral part of habitat quality for spotted owls, affecting prey base, as well as stand structure for both nesting and foraging (Carey et al. 1992). It also affects the ability of young birds to disperse and access suitable breeding habitat sites. Fragmentation is directly discussed in Thomas et al. 1990, which formed the scientific basis for the Northwest Forest Plan.

ASSUMPTIONS

- Because this is LSR there will be no further regeneration cutting or road building. Any forest habitat treatments will be precommercial or commercial thinning that will not result in downgrading of spotted owl habitat.
- This analysis only looks at fragmentation of Mature Forest habitat since that is the management objective for LSR.
- Pure pine stands are not suitable Northern Spotted owl Habitat (Carey 1985).
- Roads and water diversion canals cause hard edge effect and fragmentation of mature forest habitats.
- Hard edge ceases to exist when a neighboring stand reaches 60 feet in height. Generally 60 year conifer stands in the affected region have achieved canopy height approaching that of the general forest.
- Edge effects extend 300 feet into a stand from a hard edge. This assumption is simply for modeling purposes. In fact edge effects vary based on orientation of the edge, the ecological factor being measured; variation is stand size on both sides of the edge; and other factors. Chen et al. (1995) found climatic edge effects ranged from 30 to >240 meters into a mature forest stand. Chen et al. (1992) also found vegetation responses to edge ranged from 16 to 137 meters into the stand. Increasing or decreasing the assumed edge distance will still demonstrate the impacts of the management activities, with the degree of change increasing or decreasing. 300 feet was selected as an average for environmental factors.

DEFINITIONS

CORE AREA – That portion of a patch that is not impacted by hard edge effect, based on model assumptions. The minimum acreage for an individual patch is 1 acre.

EDGE EFFECT – Forest edge effect results primarily from differences in wind and light intensity and quality reaching a forest patch that alter microclimate and disturbance rates (Harper et al. 2005). Edge effects also include changes in humidity, seed dispersal, colonization, predator access and other ecological functions that differ between neighboring habitats.

- Hard edge occurs when two neighboring stands differ greatly in height, allowing wind, light and other environmental factors to penetrate into the taller (older) stand.
- Soft edge occurs when stands are similar in age or height but differ greatly in composition, allowing for seed dispersal, species movement and other ecological functions unique to one stand to penetrate partially into the other stand.
- This analysis will only look at Hard Edge.

FRAGMENTATION – The process of reducing size and connectivity of stands that compose a forest. Fragmentation of spotted owl habitat occurs when portions of the suitable habitat become isolated from neighboring suitable habitat through the creation of open landscapes (clearing, fire, etc) or development of unsuitable habitat types (pine stand development). Fragmentation also occurs within a stand when habitat is lost through development of large openings or when unsuitable openings or habitats encroach into the stand along the edges.

LANDSCAPE – For purposes of this analysis the landscape is the LSR 227 as it contains a number of spotted owl home ranges and is the management area being impacted by the pipeline.

LATE SUCCESSIONAL FOREST – Forest seral stages which include Mature and Old Growth classes (USDA FS & USDI BLM. 1994).

MATURE FOREST – Fir and mixed conifer forest with an average DBH of 21” and canopy closure >60%. The definition used will depend on the data available in the timber stand layer.

NORTHERN SPOTTED OWL HABITAT – The forest vegetation with the age class, species of trees, structure, sufficient area, and adequate food source to meet some or all of the life needs of the northern spotted owl.

OLD GROWTH FOREST – A forest stand usually at least 180-220 years old with moderate to high canopy closure; a multi species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulation of wood, including large logs on the ground.

PATCH – A single contiguous block of forests that provided for one or more of the survival needs of the northern spotted owl (nesting, roosting and/or foraging). Areas within the patch may provide for single or multiple needs while other portions of the patch meet different needs. Minimum acreage for a patch is 1 acre.

PIPELINE CORRIDOR – The 30 foot width of the maintained pipeline corridor and the additional cleared width of the corridor from the construction activity needs. This is estimated at 100 feet total width within the segment being analyzed, due to the flat nature of the landscape. The construction strip will be reforested, resulting in the narrower 30 foot width of corridor after approximately 40 years.

EDGE EFFECT – The alteration of habitat characteristics within a stand from a neighboring stand. For example, creation of an open area adjacent to mature forest allows wind and light to penetrate into the mature stand, altering the plant species mix along the edge. Edge effect varies in distance depending on orientation of the respective stands (is the opening on the south or north face of the mature stand), impact being measured (light, wind, seed dispersal…), stand condition (dense forest, thinned…) and other factors. For analysis purposes a set distance of 300 feet into the stand is used as an average.

STEPS IN THE ANALYSIS

Measures to be Compared –

Patch

- Number of isolated patches of mature forest
- Total acres of Mature forest
- Average patch size of Mature Forest
- Average distance between patches

Core

- Number of isolated patches of Mature forest cores greater than 1 acre
- Total acres of Mature forest core in patches greater than 1 acre
- Average patch size of Mature Forest cores greater than 1 acre

Edge

- Total edge length around Mature forest patches
- Average edge length around Mature forest patches
- An index of fragmentation that is Avg. Edge/Avg. patch acres

ANALYSIS AREA - The LSR is the basic landscape being analyzed. This landscape will be buffered out to the nearest hard edge break for all stands along the boundary of the LSR for determining edge effects.

CURRENT FRAGMENTATION
Current fragmentation within this LSR comes from natural landscape patterns (lava beds and meadows primarily), past timber harvest, replanting to pine to prevent frost problems, road and canal construction, the damming of Fish Lake, and management on private land inholdings.

POST PIPELINE FRAGMENTATION
Fragmentation within the LSR will increase due to the development of the pipeline corridor as it passes through conifer forested stands of a variety of ages.

60 YEAR FRAGMENTATION
Fragmentation is predicted to be reduced after 60 years due to revegetation of closed roads through mitigation, revegetation of the construction strip along the pipeline, and maturation of historic clearcuts and shelterwoods across the LSR. Treatment of the Big Elk pine stands will be designed to convert to mixed conifer. These stands will therefore convert from Dispersal habitat only to Dispersal or potentially Foraging habitat.

Additional stands will grow into Mature Forest.

The steps taken in the GIS analysis are described in Appendix A.

RESULTS

The results of the GIS run are shown below for the three analysis periods. An additional run was done at 60 years for just those stands adjacent to the pipeline corridor and the roads proposed for closure to show the specific impacts of those actions.

LSR 227 Fragmentation Analysis

	Current Conditions	Following Pipeline Construction	60 years out following road closures	60 years out following road closures, Stands adj. to pipeline and mitigation road closures
Patch Metrics				
Number of Isolated patches of mature forest:	1445	1450	1501	298
Total acres of Mature forest:	12,373.53	12,350.60	12,773.1	4555.001
Total acres of Mature forest (patches)	9,994.69	9,976.04	10,218.6	4191.96
Average patch size of Mature forest:	6.92	6.88	6.81	14.07
Average distance between patches:				
Core Metrics				
Number of isolated patches of Mature forest cores greater than 1 acre	779	771	901	155
Total acres of Mature forest core in patches greater than 1 acre	5076.27	5013.82	5990.87	2839.52
Average patch size (acres) of Mature Forest cores greater than 1 acre	6.52	6.5	6.65	18.32
Edge Metrics				
Total edge length (ft) around Mature forest patches	596,667.54	605,267.45	533,811.61	157549.103
Average edge length (ft) around Mature forest patches	202.95	203.86	205.63	263.46

An index of fragmentation that is Avg. Edge/ Avg. patch acres	29.32803468	29.63081395	30.19530103	18.7249467

The LSR currently includes 1,445 patches of mature forest greater than 1 acre in size. Construction of the pipeline results in slightly greater fragmentation by passing through and dividing some patches so that there is a net increase of 5 patches. After 60 years the number of patches across the landscape increases to 1,501, as numerous stands age and develop the characteristics of a mature forest. At the full landscape scale the development of these small, new patches result in the average patch size actually decreasing over 60 years from 6.92 to 6.1 acres. The patch sizes immediately adjacent to the pipeline and decommissioned roads increase to an average of 14 acres. As this is more than twice the average patch size and the opposite trend in average change across the LSR, the benefit of road closures on fragmentation are clearly shown.

Generically speaking, as patches increase in size the amount of edge around the patch increases at a much slower rate. For this reason the formula of Edge/Acres is a good measure of fragmentation. This index shows a decrease in Fragmentation from 33.67 currently to 31.12 in 60 years. This is a 9% reduction in fragmentation across the landscape. For the stands immediately adjacent to the pipeline and decommissioned roads this fragmentation index falls to 18.7, a 36% reduction over the LSR average.

Because of edge effects, an isolated 1 acre patch of Mature Forest has little real value as spotted owl habitat. For this reason we also looked at interior patches– 1 acre or larger blocks of Mature Forest that were 300 feet or more from a hard edge. Currently the forest has 779 of these interior patches. Eight of these interior patches would be fragmented by the pipeline corridor. Route realignments such as Big Elk avoided XX interior patches. With the maturation of harvested stands, the planted portion of the pipeline and planted segments of decommissioned roads, the number of cores increases to 901. This represents more than a 14% increase in the number of core areas across the landscape and a greater than 16% increase in total acres of Mature Forest within these patches. The average patch size of the cores also increases slightly. The average patch size of these cores increases only slightly to 6.65 acres from 6.5 acres. Core areas adjacent to the management activities increase in size to 18 acres. As the pipeline will remain as an edge creating feature after 60 years, this near tripling of acres in the adjacent cores is entirely attributable to the road decommissioning efforts.

CONCLUSIONS

Decommissioning of roads results in greatly reduced fragmentation in the stands immediately adjacent to the roads and a 9% decrease in fragmentation across the landscape, in conjunction with the aging of all stands across that landscape. In the 60 year interval modeled, none of the decommissioned roads will convert to mature forest; they simply grow tall enough to eliminate light and wind related edges along the boundaries of existing mature forest stands. The doubling in size of patches adjacent to management activities indicates that the timber growth in these road beds eliminate the barrier effect for forest dependant small animals and shade dependant plant species, allowing dispersal across these current gaps. Overall stand fragmentation is greatly reduced in the areas immediately adjacent to these roads and measurably reduced across the entire LSR.

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Appendix A
Fragmentation Analysis Workflow

Jeremy Hobson

Patches

To identify patches of mature forest, I used the following selection criteria on the GNN layer:
CANCOV ≥ 60, QMDA_DOM ≥ 53.34 (21")
I overlaid the Mature Forest layer with fragmentation features and erased the intersecting area from the mature forest layer, resulting in the creation of the patches layer.

Current conditions

To calculate patch metrics, I selected the grid representing mature forest (as described above) and erased features with fragmentation effects, including:
Roads (all roads, 30' buffer)
Canals (60' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)
Timber stands less than 40 years of age (identified from activities database; used activities polygons and selected all those polygons with cutting activities since 1973)

Conditions following pipeline construction

To calculate patch metrics, I selected the grid representing mature forest (as described above) and erased features with fragmentation effects, including:
Roads (all roads, 30' buffer)
Canals (60' buffer)
Pipeline corridor (100' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)
Timber stands less than 40 years of age (identified from activities database; used activities polygons and selected all those polygons with cutting activities since 1973)

Conditions 60 years out after road closures

To calculate patch metrics, I selected the grid representing mature forest (as described above) and erased features with fragmentation effects, including:
Roads (all roads, less decommissioned roads, 30' buffer)
Canals (60' buffer)
Pipeline corridor (30' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)

Core

The calculation of Core metrics was accomplished by overlapping the fragmentation features with the mature forest selection, and erasing mature forest where overlapping occurred. Fragmentation feature edges were buffered 300.

Current Conditions

To represent core areas, the mature forest layer will need to be buffered into 300' by the fragmentation edges, including:
Roads (all roads, 30' buffer)
Canals (60' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)
Timber stands less than 40 years of age (identified from activities database; used activities polygons and selected all those polygons with cutting activities since 1973)

Conditions following pipeline construction

To represent core areas, the mature forest layer will need to be buffered into 300' by the fragmentation edges, including:
Roads (all roads, 30' buffer)
Canals (60' buffer)
Pipeline (100' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)
Timber stands less than 40 years of age (identified from activities database)

Conditions 60 years out after road closures

To represent core areas, the mature forest layer will need to be buffered into 300' by the fragmentation edges, including:
Roads (all roads with decommissioned roads removed, 30' buffer)
Canals (60' buffer)
Pipeline (30' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)

Edge

To calculate edge metrics, I intersected fragmentation features (as listed below) with the mature forest layer; only those overlapping regions were identified as imposing an edge effect and were included in the metrics. The mature forest layer was selected on to identify all patches (areas > = 1 acre) and all edges intersecting these features were identified and included in the metrics – therefore, edges associated with mature forest areas less than 1 acre were not included in the metrics.

Current Conditions

Edge will occur where mature forest patches intersect the following features:
Roads (all roads, 30' buffer)
Canals (60' buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)
Edges of timber stands, less than 40 years of age (identified from activities database)

Conditions following pipeline construction

Edge will occur where mature forest patches intersect the following features:
Roads (all roads, 30' buffer)

Pipeline corridor (100’ buffer)
Canals (60’ buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)
Edges of timber stands, less than 40 years of age (identified from activities database)

Conditions 60 years out after road closures

Edge will occur where mature forest patches intersect the following features:
Pipeline corridor (30’ buffer)
Roads (All roads with decommissioned roads removed, 30’ buffer)
Canals (60’ buffer)
Waterbodies
Wetlands
Non-forested vegetation polygon layer
Non-forested habitat derived from the veg_gnn layer (CANCOV = 0)

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Appendix F-2

Amendment to the Draft Compensatory Mitigation Plan

Pam Barnes
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Williams Pacific Connector
Gas Operator
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August 13, 2015

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Pacific Connector Pipeline, LP
Docket No. CP13-492

Dear Ms. Bose:

Williams Pacific Connector Gas Operator, LLC, acting as the Engineering, Procurement and Construction Management contractor, on behalf of Pacific Connector Gas Pipeline LP, submits information to amend the Draft Compensatory Mitigation Plan, Appendix O to the Applicant Prepared Draft Biological Assessment. The revision replaces the Agreement in Principle - Compensatory Mitigation for ESA Impacts (AIP) document filed on June 19, 2015. The U.S. Fish & Wildlife Service has informed Williams Pacific Connector Gas Operator, LLC that they are retracting the AIP.

Respectfully submitted,

/s/ Pam Barnes

Pam Barnes

Attachments

cc: Paul Friedman
Randy Miller

Pacific Connector Gas Pipeline Project—Project Mitigation Proposal to FERC— Compensatory Mitigation for ESA Impacts

Williams Pacific Connector Gas Operator, LLC, on behalf of Pacific Connector Gas Pipeline L.P. (Pacific Connector, or Project) submits the following proposal to the Federal Energy Regulatory Commission (FERC) staff and requests that FERC staff include the proposal as a supplement to the Proposed Action in FERC's Biological Assessment (BA) and also requests that these proposed mitigation actions be evaluated in the Final Environmental Impact Statement (FEIS) for the Project.

Mitigation Proposal

Pacific Connector considered the habitat categories, definitions mitigation concepts and compensatory ratios presented in the U.S. Fish and Wildlife Service's Revised Conservation Framework (Conservation Framework) for the Northern Spotted Owl and Marbled Murrelet (U.S. Fish and Wildlife Service (Service), 2014) when drafting the Compensatory Mitigation Plan (CMP) appended to the BA. Within the draft CMP, Pacific Connector is not in agreement with the Service-recommended mitigation ratios or area of effects to be considered for mitigation that are included in the Conservation Framework. Also, Pacific Connector proposed a different mitigation concept to compensate for direct effects to Marbled Murrelet (MAMU) within the Project area. Mitigation concepts presented in the draft CMP include:

- Acquisition of MAMU and Northern Spotted Owl (NSO) habitat within the range of the MAMU (MAMU Inland Zones 1 and 2) for habitat to be removed by the PCGP Project, considering different mitigation ratios than those presented in the Conservation Framework (Tables 7 and 9, draft CMP);

- Application of Forest Service (FS) and Bureau of Land Management (BLM) mitigation projects accepted by Pacific Connector are intended to compensate for:

    - NSO habitat removed outside of the range of MAMU, including high quality habitat (nesting, roosting, and foraging (NRF) habitat, and High NRF habitat);

    - FS and BLM mitigation projects also are intended to provide mitigation for other indirect habitat effects (forest fragmentation and edge effects within 100 meters of habitat removal).

To ensure a net conservation benefit to the species consistent with Pacific Connector's discussion filed with FERC staff on May 23, 2015. Pacific Connector proposes two alternative mitigation approaches below that replace the current draft CMP. Option One is Pacific Connector's revised proposal presented in the draft CMP, which applies the Service's mitigation ratios presented in the Conservation Framework only to MAMU suitable and NSO

High NRF / NRF removed. An alternative proposal, "Option Two," features Service-recommended mitigation ratios applied to an expanded area of affect (habitat removed and other indirect effects out 100 meters from habitat removal) and a more prominent role for the Service in the acquisition and preservation of NSO and MAMU habitat. The options differ chiefly in the amount of NSO and MAMU habitat affected by the Project that would be included in the calculation of necessary habitat acquisition acres using the Service's mitigation ratios to result in a net benefit to NSO and MAMU. Their other components are identical, and are described as "Common Components" following the descriptions of Conservation Program Options One and Two. Pacific Connector will implement Option Two preferentially, provided that it can be implemented at the cost figures it stipulates as total cost for acquisition of conservation habitat.

Pacific Connector also proposes revised measures described below would be utilized to offset and minimize the significance of other direct and indirect adverse effects of the Project to NSO and MAMU, and to three federally-listed plant species (Applegate's milkvetch, Kincaid's lupine, and Gentner's fritillary) that are not fully avoidable through other actions incorporated into the Project.

Implementation of the following measures is contingent upon the Project receiving necessary authorizations to construct the Project, including a Biological Opinion (BO) from the Service under the consultation requirements of section 7(a)(2) of the Endangered Species Act (ESA.)

NSO and MAMU Mitigation -- Conservation Program Option One

To address habitat removal impacts to NSO and MAMU, Pacific Connector would do the following: Develop a Conservation Program to achieve protection of larger parcels of MAMU and NSO habitat currently in nonfederal ownership, and long-term management of those parcels for the benefit of the species. Based on currently best available information about baseline ecological conditions, the location, design, construction and implementation of the Project, and about likely associated impacts from the Project, Pacific Connector has examined a variety of habitat and landownership scenarios for their potential to adequately offset the impacts.

Pacific Connector would achieve protection of approximately 2,700 acres of older forest habitat occurring on private lands (where it is generally easy to satisfy basic mitigation principles and standards.) Approximately 400 acres of that should be predominantly highest quality suitable habitat (High NRF and Suitable) to compensate for removal of approximately 46 acres of high quality habitat in the range of the MAMU. The other 2,300 acres would target late seral forest containing NRF/High NRF habitat to compensate for removal of approximately 520 acres of other NSO NRF / High NRF habitat removed within and outside the MAMU Range, with the exception of NSO NRF / High NRF habitat that overlaps MAMU Suitable habitat (included in the first Habitat Category). To meaningfully offset impacts, the habitat should occur as contiguously as possible—either in a single large block or in no more than 2-3 mid-size blocks occurring within a relatively small landscape area or where a parcel fills a gap in an existing protected land allocation of Critical Habitat.

Pacific Connector would utilize the services and expertise of a Conservation Program Fund

Manager as necessary to address acquisition support, procedural and management issues related to Pacific Connector's commitment to acquire parcels of MAMU and NSO habitat for management and conservation.

NSO and MAMU Mitigation -- Conservation Program Option Two

To address impacts to NSO and MAMU, Pacific Connector would do the following:

A. Develop a Conservation Program to achieve protection of larger parcels of MAMU and NSO habitat currently in nonfederal ownership, and long-term management of those parcels for the benefit of the species. Based on currently best available information about baseline ecological conditions, the location, design, construction and implementation of the Project, and about likely associated impacts from the Project, the Service has examined a variety of habitat and landownership scenarios for their potential to adequately offset the impacts. The Service has advised Pacific Connector that the Conservation Program should result in one of (or a combination of) three biological/habitat scenarios being achieved —

(1) Protection of approximately 4,800 acres of older forest habitat occurring on private lands (where it is generally easy to satisfy basic mitigation principles and standards.) That acreage should be predominantly highest quality suitable habitat (High NRF and Suitable), but could include up to 20% NRF. To meaningfully offset impacts, the habitat should occur as contiguously as possible—either in a single large block or in no more than 2-3 mid-size blocks occurring within a relatively small landscape area or where a parcel fills a gap in an existing protected land allocation of Critical Habitat.

(2) Protection of approximately 7,700-acres consisting primarily of lower quality (i.e. NRF) suitable habitat on private lands and occurring as contiguously as possible-- either in a single large block or in no more than 2-3 mid-size blocks occurring within a relatively small landscape area or where a parcel fills a gap in an existing protected land allocation of Critical Habitat.

(3) Protection of older and structurally advanced forest habitat occurring on state lands in the form of 10,000-15,000-acres of NRF and 2,000-5,000-acres of "almost-NRF", or some functionally equivalent mix of habitats, most of which would occur in large patches (with some smaller and/or dispersed patches) and within a relatively contiguous 15,000-25,000- acres segment of state land.

The Service has further advised Pacific Connector that, in light of the baseline ecological conditions and relative conservation importance of various landownerships, the most practicable and, from a conservation perspective, preferred, outcome of the Conservation Program is protection of older and structurally advanced forests occurring primarily on state lands (in the form of currently suitable and nearly suitable NSO habitat mostly in large patches and within a relatively contiguous segment of the state land) but also including several hundred acres of MAMU Suitable habitat currently in private ownership.

B. Fund the Conservation Program as follows—

(1) $45 million for the habitat protection discussed above, including for acreage of non-habitat necessary to address legal, procedural, and management issues that would otherwise preclude acquisition of the targeted higher quality habitats;

(2) $4.5 million for long-term management of the protected lands and associated NSO and MAMU populations; and

(3) additional funds necessary for transactional due diligence, such as boundary survey(s), appraisal(s), services and expertise of the Conservation Program Fund Manager and other transaction costs associated with the acquisitions and/or conservation easements (however, any purchase option payments would be accounted against the $45 million noted above).

The funding amounts identified above take into consideration information provided to Pacific Connector by the Service about the likely costs associated with achieving the biological/habitat-based scenarios described in A. The Service developed that information in consultation with The Conservation Fund (TCF)[1] and the Oregon Departments of Forestry and State Lands. Based on that information and additional information developed independently by the Project, Pacific Connector believes this funding would allow the Conservation Program to achieve the habitat outcomes identified by the Service.

Common Components

The following components would be included as a compliment to either of Conservation Program Option One or Two:

1. **To carry out and fund the Conservation Program (Option One or Two), Pacific Connector would do the following:**

A. Ensure that the Conservation Program includes the following provisions—

(1) Purchase of conservation easement(s) and, as necessary, fee-title interests, would be the means by which the above habitats and acres would be protected. The conservation easements would result in protection-in-perpetuity of these lands, allowing only for management actions necessary to preserve the status of currently suitable habitats and, where appropriate, to expedite and enhance the attainment of suitability in currently unsuitable habitats. Management actions occurring on the latter

[1] TCF is a national charitable organization with a mission to conserve America's most important lands and water resources through a partnership approach with public and private interests to achieve sustainable solutions that balance economic growth with environmental protection. TCF has experience implementing regulatory and voluntary mitigation projects, court approved consent decrees, natural resources damage assessments, habitat restoration plans, supplemental environmental projects, and other forms of legal settlements.

should not adversely affect the former. Conservation easement would not necessarily preclude income-generation from management actions on some of the currently unsuitable habitats provided the actions are consistent with the above conditions and the resulting income is utilized to support long-term management of conservation easement lands and associated NSO and MAMU populations.

(2) Long-term management plan(s) would be developed to identify the specific actions necessary to satisfy the provisions of the conservation easements.

(3) Ownership of conservation easements and, if applicable, fee-title, would be transferred to an appropriate, Service-approved conservation-focused land management entity(s) for the purposes of long term oversight and implementation of the conservation easement and management plan.

(4) Decision authority regarding the specific lands protected, dispersal of funds to protect those lands, and the long-term management and ownership of those lands would not reside with Pacific Connector, but would be vested in a) a Service-approved Conservation Program Fund Manager (an appropriate land trust or similar entity) for the purposes of receiving, managing and dispersing Conservation Program funds to undertake and complete fee-title and conservation easement acquisitions, including preliminary due diligence and ensuring final ownership as described in 1.A(1); and b) the Service for the purposes of providing direction, guidance and oversight, including final right-of-approval, to any projects proposed by the Conservation Program Fund Manager (or any other party) for the Conservation Program, and to the activities of the Conservation Program Fund Manager related to those projects, in order to ensure adequate Conservation Program outcomes.

B. Contribute $197,400 (plus administrative overhead cost, not to exceed 40%) to support the barred owl management program in a manner identified by the Service[2].

C. Contribute $350,000 (plus administrative overhead cost, not to exceed 40%) to support a program, identified by the Service, to reduce MAMU nest predation[3].

D. Decision-making and receipt and management of funds for 1.B and 1.C would be vested as described for the Conservation Program, except that, at the discretion of the Service, funds may be provided directly by Pacific Connector to the applicable action entities rather than a third-party fund manager or, if a fund manager is utilized, might be different than the Conservation Program Fund Manager.

E. Provide separate funding to BLM and Forest Service, and/or undertake other actions directed by those agencies, for the implementation of those agencies' Compensatory Mitigation Plan Actions (CMPAs) as described in FERC's DEIS for the Project, or as otherwise modified by BLM and Forest Service to achieve similar ecological outcomes.

[2,3] The amount of funding and the recipient activities identified in 1.D and 1.E derive directly from Service suggestions about how to offset certain disturbance- and disruption-related impacts from the Project.

The Service, BLM and Forest Service have coordinated to ensure that the CMPAs would be a substantial source of measures to offset impacts of the Project to NSO and MAMU. In the absence of the CMPAs, the Conservation Program and other actions described above would need to be supplemented.

2. **To address impacts to ESA-listed plants, Pacific Connector would do the following:**

A. Fund conservation easements/land acquisition and third party management and maintenance for ESA-listed plants, as identified by the Service, including at least $39,108 for Applegate's milkvetch, at least $48,500 for Kincaid's lupine, and at least $47,400 for Gentner's fritillary. (Estimates provided here are for conservation easements; if acquisition was necessary to secure these parcels the cost would be roughly double.)

B. Contribute a combined $114,940 for additional third party acquisition or research, as identified by the Service, in place of the salvage BMP for both Applegate's milkvetch and Kincaid's lupine.

C. Contribute $20,000 to the work of a Service-approved conservation entity in place of the second year of surveys and the associated avoidance and minimization BMPs for Gentner's fritillary.

D. Contribute $24,500 to the work of a Service-approved conservation entity in place of the second year of the seed collection BMP for Applegate's milkvetch and Kincaid's lupine.

E. Decision-making and receipt and management of funds for 2.A-D would be vested as described for the Conservation Program, except that, at the discretion of the Service, funds may be provided directly by Pacific Connector to applicable action entities rather than a third-party fund manager or, if a fund manager is utilized, might be different than the Conservation Program Fund Manager.

3. To further implement the measures described in items 1 and 2, above, Pacific Connector would do the following:

A. Funding for items 1.A-E and 2.A-E would be placed into a non-wasting, interest-bearing bank account(s) no later than 30-days after receipt of a Notice to Proceed with construction of the Project, and thereby be available to the parties that would be authorized to disperse funds necessary to identify, develop, and implement the described conservation actions.

B. Develop formal agreements with the Service (and other parties, as necessary) that further specify the roles and responsibilities of each party. In particular, these agreements would describe the disposition of funds provided by Pacific Connector into specific accounts and/or to specific recipients, and expectations and intent regarding use of the funds/accounts, including the roles of various parties in associated decision-making. Any agreements between the Project and other parties which might be necessary to implement this proposal (e.g. a Conservation Program Fund Manager) would be subject to advance review and

approval by the Service or, if preferred by the Service, would include the Service as a party to the agreement (in addition to an agreement(s) directly between the Service and Pacific Connector.)

C. Pacific Connector would collaborate with the Service during the ongoing review of the Project under the ESA and NEPA to better determine the types of agreements and potential parties that may be applicable. Pacific Connector would defer to the Service regarding the most appropriate time (relative to the ongoing regulatory reviews) to draft and finalize such agreements.

Pacific Connector believes the both options are reasonable, but notes additionally with respect to Option Two that: a) the actions included in the proposal directly adhere to specific suggestions and guidance from the Service; b) the Service has suggested to Pacific Connector that such actions would (in conjunction with a wide range of other conservation measures included in the Project) adequately offset and minimize the significance of applicable direct and indirect adverse effects of the Project to the subject species, and; c) the specific funding amounts described were developed in consideration of information from the Service and other knowledgeable sources about likely costs of the actions.

Pacific Connector assumes that if FERC incorporates this proposal into the BA and retains discretion over associated measures, the Service's BO will be informed by this proposal and by the factors described in the preceding paragraph that indicate the adequacy of the proposal. However, Pacific Connector also realizes that, while these will all inform the BO, they do not predetermine an outcome of the BO. An outcome can be reached only after full analysis (under both ESA and NEPA) of the Project's final locations, activities and impacts to listed species, and associated reassessment of actions, funding, and other information incorporated in this proposal. If new information and analyses lead the Service to conclude the actions, funding or other aspects of this proposal will not satisfy the requirements of section 7(a)(2) of the ESA, Pacific Connector will work with the Service and FERC to appropriately revise the proposal.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Doc Type: F

AUG 13 2015

Mr. Randy Miller
Environmental Manager, Pacific Connector Pipeline Project
Williams Pipeline Company
295 Chipeta Way
Salt Lake City, Utah 84108

Dear Mr. Miller:

In accordance with discussions between the parties, the U.S. Fish and Wildlife Service hereby withdraws from the Agreement in Principle for Compensatory Mitigation for Impacts, Pacific Connector Gas Pipeline Project, dated June 10, 2015.

Sincerely,

Paul Henson

Paul Henson, Ph.D.
State Supervisor